APPENDICES

APPENDIX A

A.1 East Clayton Proposed Street Standards
A.2 East Clayton NCP Appropriate Application of Traffic Calming Measures

APPENDIX A.1
TRANSPORTATION BACKGROUND TECHNICAL REPORTS

1. "Clayton Generalized NCP Transportation Planning Stage 1 Report: Background Data, Issues, Objectives, Opportunities and Constraints", May 5, 1997, Reid Crowther & Partners Ltd.

2. Technical Memo entitled "Clayton Generalized Neighbourhood Concept Plan: Major Road Network Requirements", December 12, 1997, Reid Crowther & Partners Ltd.

3. Technical Memo entitled "Refinements to Clayton GNCP Road Network", May 14, 1998, Reid Crowther & Partners Ltd.

4. "Clayton Generalized NCP: Engineering Servicing Plan Report", November, 1998, Reid Crowther & Partners Ltd.

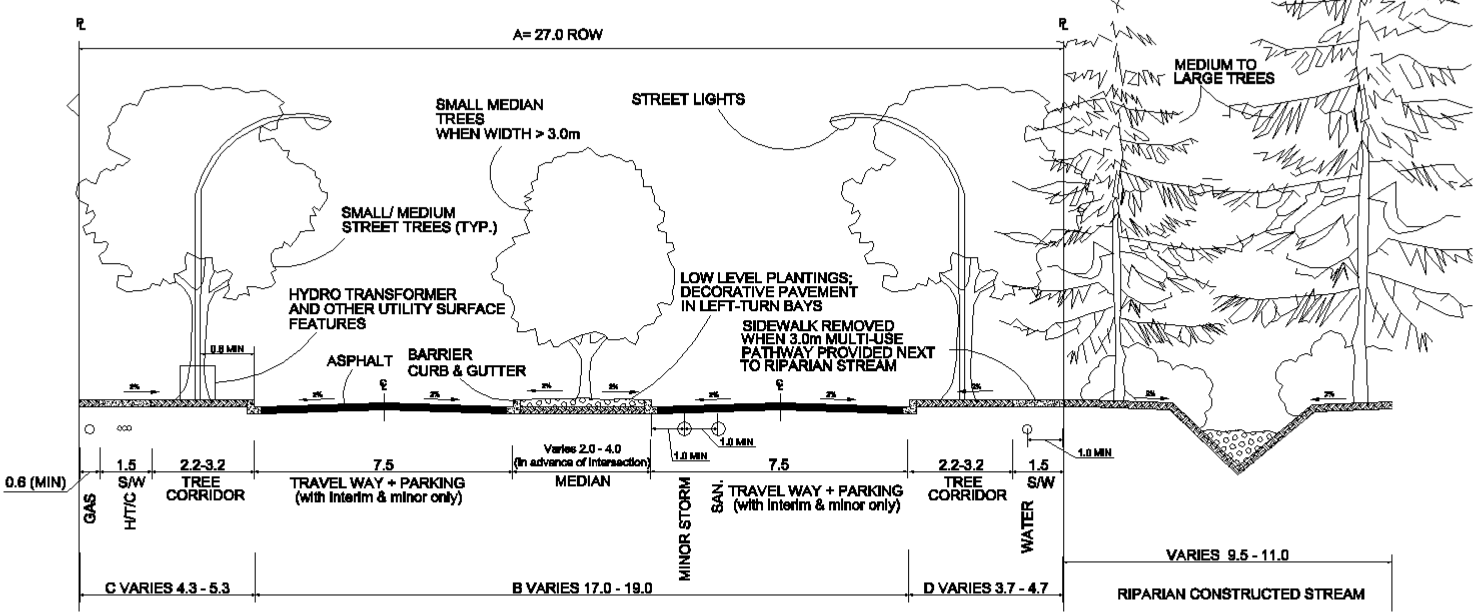
5. "East Clayton NCP Sustainable Development: Transportation, Drainage, Water Supply and Sanitary Servicing Issues and Constraints", April, 1999, Reid Crowther & Partners Ltd.

6. "East Clayton NCP Sustainable Development: Transportation and Drainage Servicing Concept Plan", July 27, 1999, Reid Crowther & Partners Ltd.

7. "Clayton Transportation Modelling", October 13, 1999, Reid Crowther & Partners Ltd.

ARTERIAL	MAJOR	PARKWAY (ULTIMATE & INTERIM)
		RIPARIAN PARKWAY (ULTIMATE & INTERIM)
	MINOR	PARKWAY

A



A= 27.0 ROW
MEDIUM TO LARGE TREES
SMALL MEDIAN TREES WHEN WIDTH > 3.0m
STREET LIGHTS
SMALL/ MEDIUM STREET TREES (TYP.)
HYDRO TRANSFORMER AND OTHER UTILITY SURFACE FEATURES
LOW LEVEL PLANTINGS; DECORATIVE PAVEMENT IN LEFT-TURN BAYS
SIDEWALK REMOVED WHEN 3.0m MULTI-USE PATHWAY PROVIDED NEXT TO RIPARIAN STREAM
0.6 MIN
ASPHALT
BARRIER CURB & GUTTER
Varies 2.0 - 4.0 (in advance of intersection)
1.0 MIN
0.6 (MIN)
1.5 S/W
2.2-3.2 TREE CORRIDOR
7.5 TRAVEL WAY + PARKING (with interim & minor only)
MEDIAN
7.5 TRAVEL WAY + PARKING (with interim & minor only)
2.2-3.2 TREE CORRIDOR
1.5 S/W
GAS
H/T/C
MINOR STORM
SAN.
WATER
VARIES 9.5 - 11.0
C VARIES 4.3 - 5.3
B VARIES 17.0 - 19.0
D VARIES 3.7 - 4.7
RIPARIAN CONSTRUCTED STREAM

NOTE:

1. ULTIMATE MAJOR PARKWAY HAS 4 TRAVEL LANES, INTERIM AND MINOR PARKWAYS HAVE 2 TRAVEL LANES WITH PARKING
2. MEDIAN COULD BE WIDENED TO 4.0m TO ALLOW FOR TREES, WITH ROW = 29.0m
3. INTERIM STANDARD OF MAJOR/ MINOR PARKWAY HAS GRASS SWALE IN MEDIAN & TRAVEL WAYS 6.0m WIDE.
4. RIPARIAN ZONE WILL WIDEN BY 1.5m AND ONE SIDEWALK REPLACED BY A 3.0m MULTI-USE PATHWAY WITHIN THE RIPARIAN ZONE AS PART OF THE PROPOSED GREENWAY NORTH OF 70 AVENUE.
5. MINOR STORM SYSTEM WITH CATCH BASINS TO DRAIN ROAD SURFACE ONLY; RUNOFF TO BE DIRECTED TO WET PONDS.
6. HYDRO/TEL/CABLE MAY BE OVERHEAD ON POLES.

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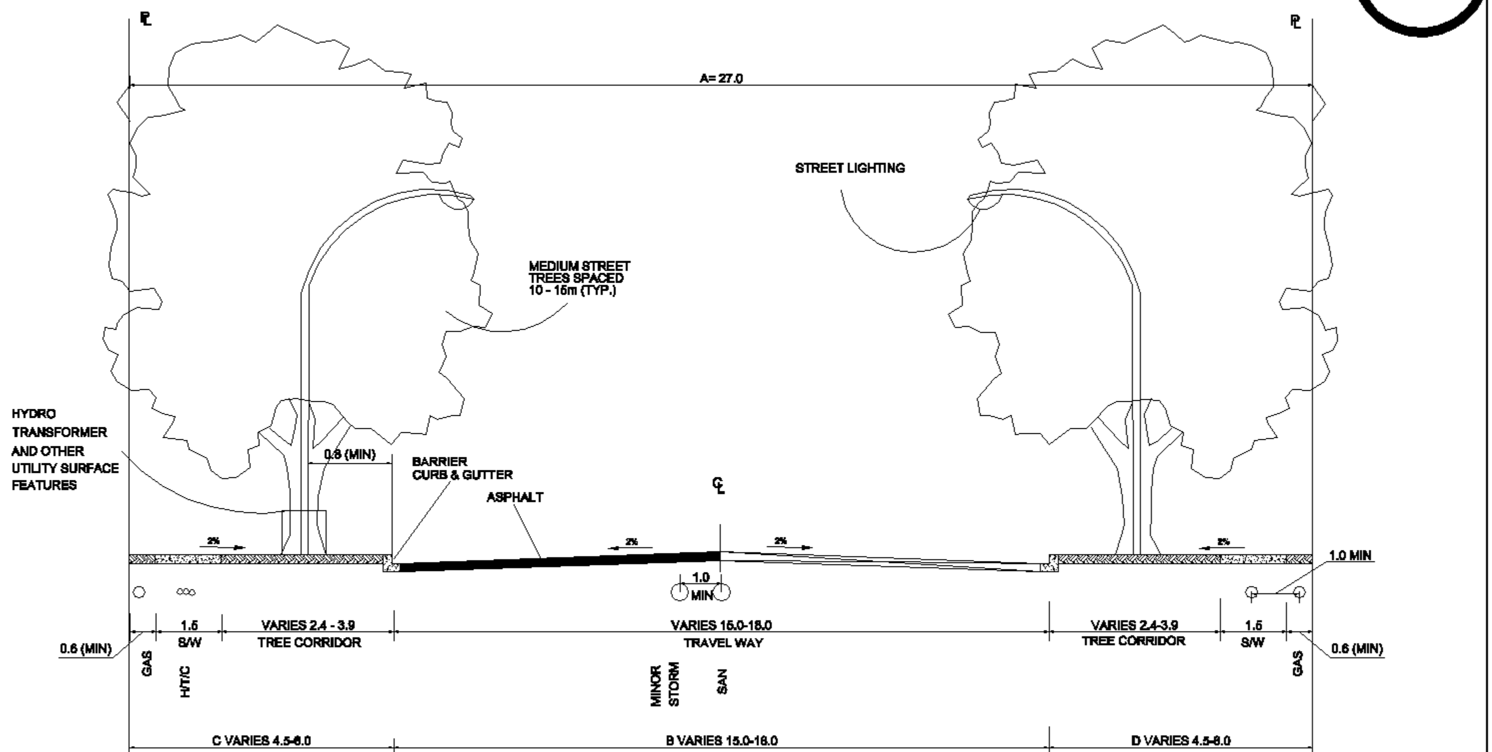
EAST CLAYTON NCP

CROSS SECTIONS : ARTERIAL PARKWAYS

FIGURE A2.1

ARTERIAL | MAJOR | TYPICAL (ULTIMATE)

B



NOTE: 1. MINOR STORM SYSTEM WITH CATCH BASINS TO DRAIN ROAD SURFACE ONLY; RUNOFF TO BE DIRECTED TO WET PONDS.

2. HYDRO/TEL/CABLE MAY BE OVERHEAD ON POLES.

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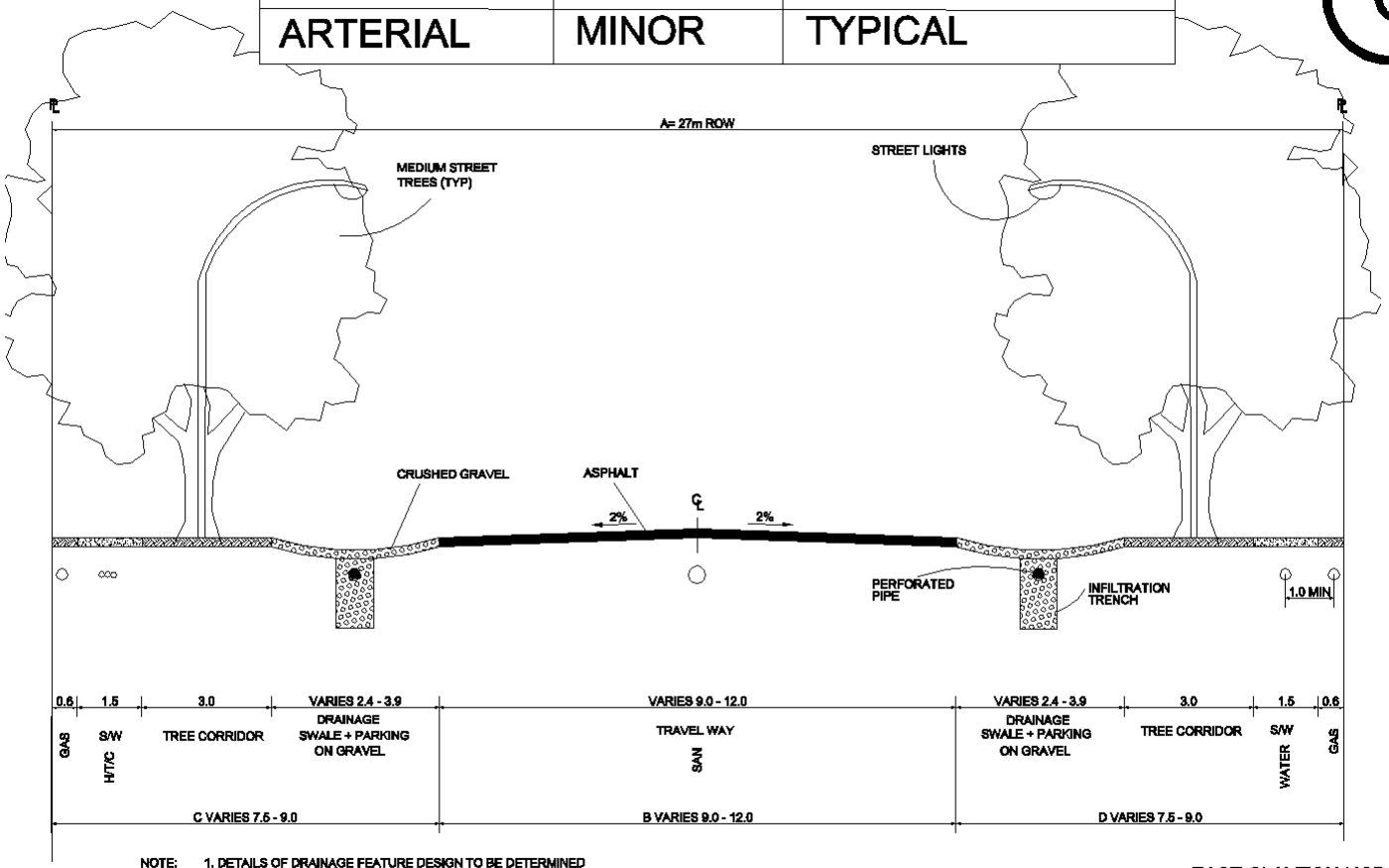
CROSS SECTION : TYPICAL ARTERIAL

Figure A2.2

ARTERIAL	MAJOR	TYPICAL (INTERIM)
ARTERIAL	MINOR	TYPICAL



NOTE: 1. DETAILS OF DRAINAGE FEATURE DESIGN TO BE DETERMINED
2. HYDRO/TEL/CABLE MAY BE OVERHEAD ON POLES.

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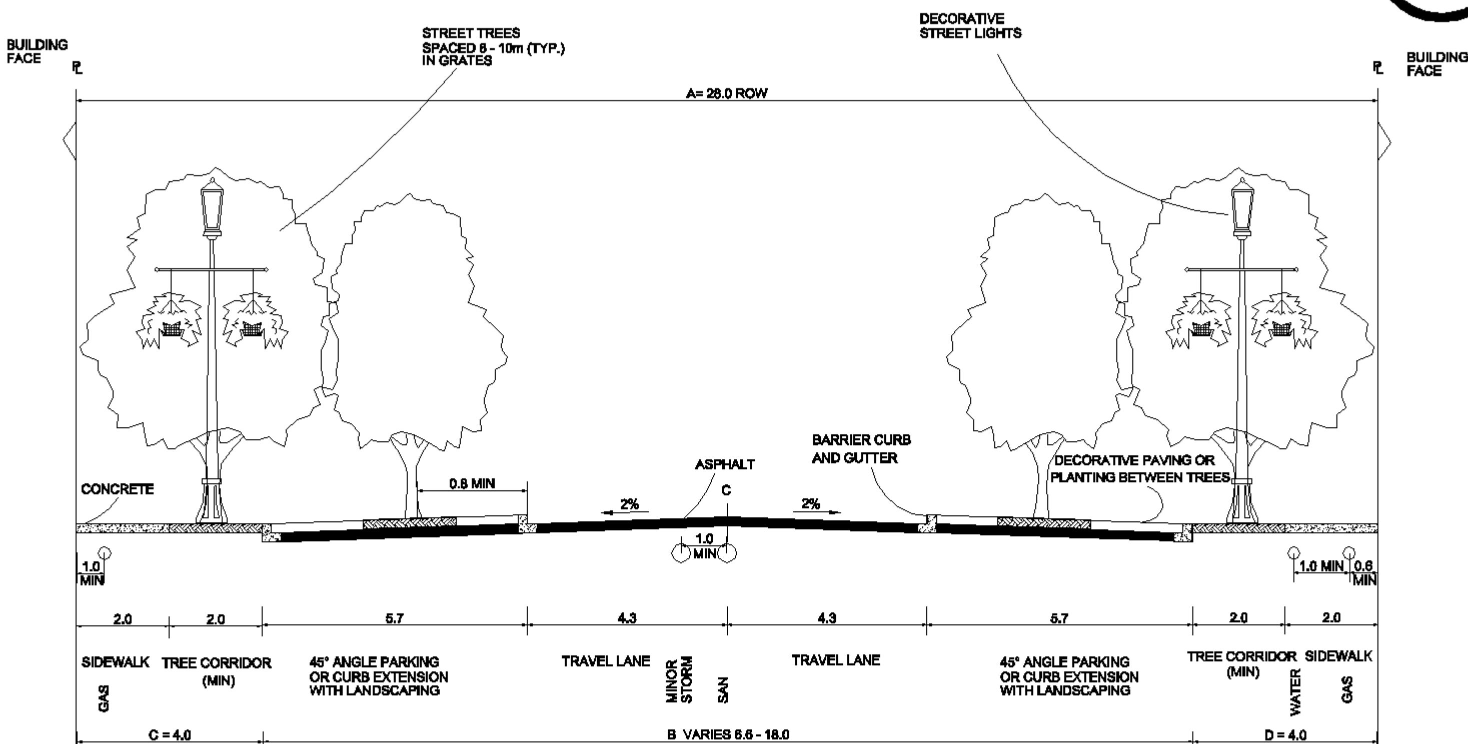
EAST CLAYTON NCP
CROSS SECTIONS : TYPICAL ARTERIALS
Figure A2.3

ARTERIAL | MINOR | MAINSTREET

D


BUILDING FACE
PL
STREET TREES SPACED 8 - 10m (TYP.) IN GRATES
DECORATIVE STREET LIGHTS
BUILDING FACE
PL
A= 28.0 ROW
BARRIER CURB AND GUTTER
ASPHALT
C
DECORATIVE PAVING OR PLANTING BETWEEN TREES
CONCRETE
0.8 MIN
2%
2%
1.0 MIN
1.0 MIN
1.0 MIN
0.6 MIN
2.0
2.0
5.7
4.3
4.3
5.7
2.0
2.0
SIDEWALK
TREE CORRIDOR (MIN)
45° ANGLE PARKING OR CURB EXTENSION WITH LANDSCAPING
TRAVEL LANE
MINOR STORM
SAN
TRAVEL LANE
45° ANGLE PARKING OR CURB EXTENSION WITH LANDSCAPING
TREE CORRIDOR (MIN)
SIDEWALK
GAS
WATER
GAS
C = 4.0
B VARIES 6.6 - 18.0
D = 4.0

NOTE:

1. 28m ROW IS GREATER THAN CURRENT CITY ARTERIAL ROW OF 27m. HOWEVER, ANGLE PARKING ALLOWS MORE ON-STREET STALLS THAN PARALLEL PARKING, PERMITTING REDUCTIONS IN ON-SITE SUPPLY ON PRIVATE PROPERTY.
2. H/T/C SHOULD GO ON POLES OVERHEAD IN REAR LANES TO AVOID LARGE SURFACE UTILITY FEATURES ON MAINSTREET ARTERIAL.
3. MINOR STORM SYSTEM WITH CATCH BASINS TO DRAIN TO ROAD ONLY; RUNOFF TO BE DIRECTED TO WET PONDS.

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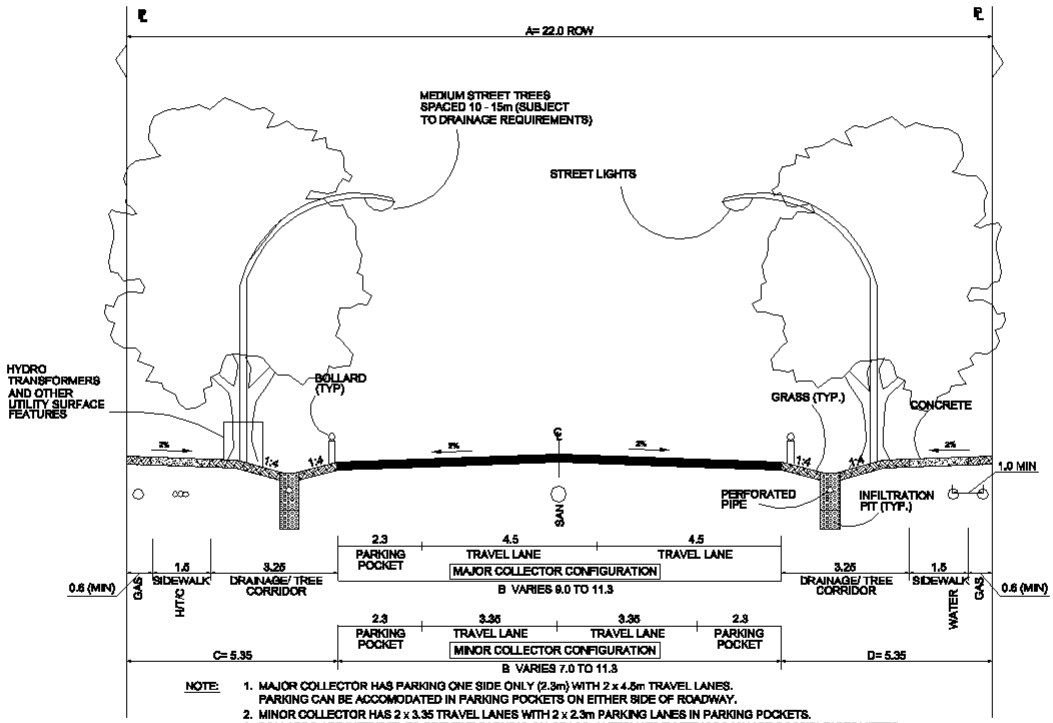
EAST CLAYTON NCP

CROSS SECTION : ARTERIAL MAINSTREET

Figure A2.4

COLLECTOR	MAJOR	RESIDENTIAL
COLLECTOR	MINOR	RESIDENTIAL

E



NOTE:

1. MAJOR COLLECTOR HAS PARKING ONE SIDE ONLY (2.3m) WITH 2 x 4.5m TRAVEL LANES. PARKING CAN BE ACCOMODATED IN PARKING POCKETS ON EITHER SIDE OF ROADWAY.
2. MINOR COLLECTOR HAS 2 x 3.35 TRAVEL LANES WITH 2 x 2.3m PARKING LANES IN PARKING POCKETS.
3. BOLLARDS ARE INTENDED TO PREVENT PARKING ON GRASS; ALTERNATIVE METHODS MAY BE POSSIBLE/ PERMITTED
4. DESIGN OF SWALE AROUND TREES AND UTILITY SURFACE FEATURES AND AT DRIVEWAY CROSSINGS, TO BE DETERMINED
5. DETAILS OF DRAINAGE FEATURE DESIGN TO BE DETERMINED
6. PAVEMENT WIDTH AT INTERSECTIONS MAY BE NARROWED BY REMOVING PARKING TO REDUCE PEDESTRIAN CROSSING DISTANCE
7. 70th AVENUE GREENWAY WILL HAVE 2.5m SIDEWALK AND DOUBLE ROW OF STREET TREES ON THE SOUTH SIDE, REQUIRING AN ULTIMATE RIGHT-OF-WAY OF 25.0m.
8. MAJOR COLLECTORS ARE DCC ELIGIBLE; MINOR COLLECTORS ARE NOT.

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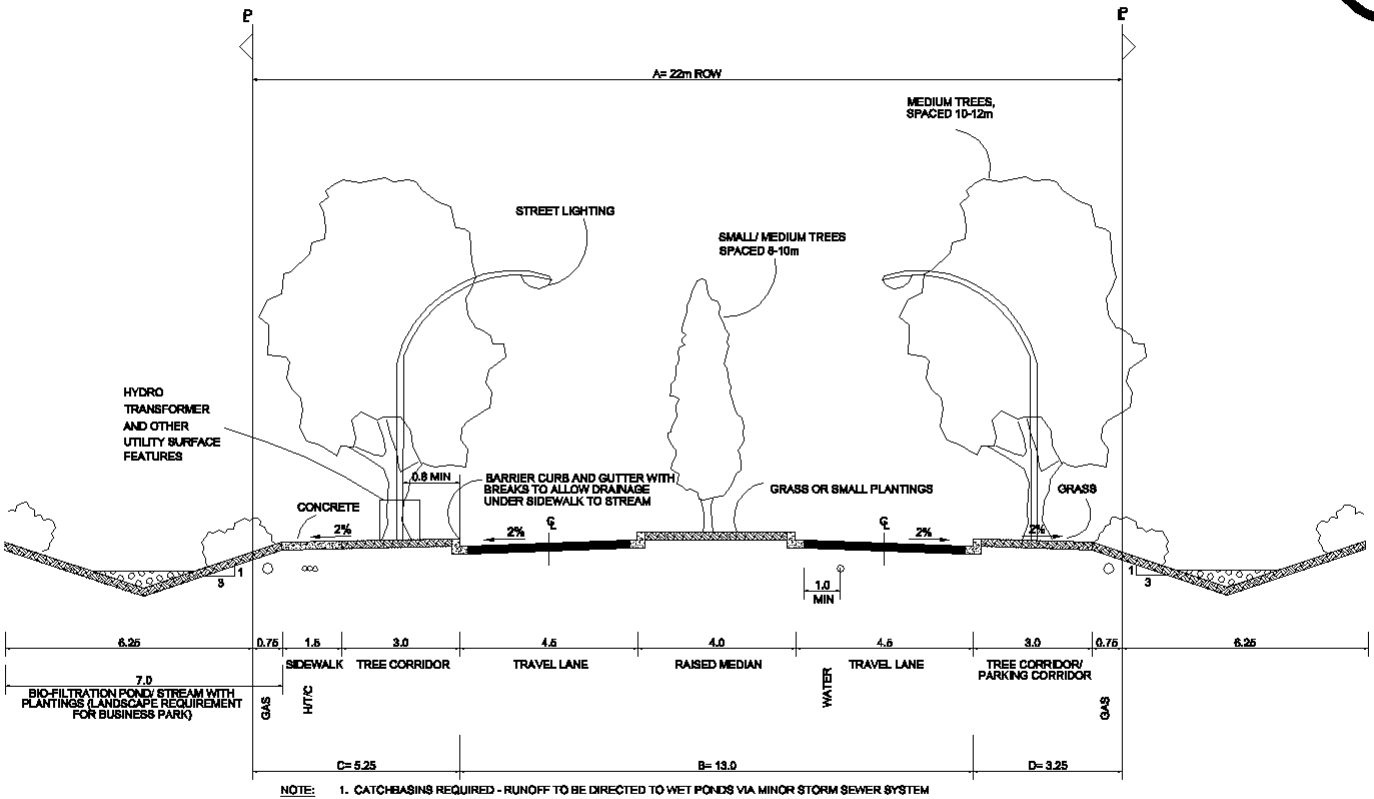
EAST CLAYTON NCP

CROSS SECTIONS : RESIDENTIAL COLLECTORS

Figure A2.5

COLLECTOR	MINOR	BUSINESS PARK

G



NOTE:
1. CATCHBASINS REQUIRED - RUNOFF TO BE DIRECTED TO WET PONDS VIA MINOR STORM SEWER SYSTEM
2. PARKING POCKETS ONLY PERMITTED ON FRONTAGE OF LIVE/ WORK AREA
3. VERTICAL CLEARANCE FOR TRUCKS MAY REQUIRE SELECTION OF COLUMNAR SHAPED TREES AND/ OR PRUNING
4. DETAILS OF DRAINAGE FEATURE DESIGN TO BE DETERMINED

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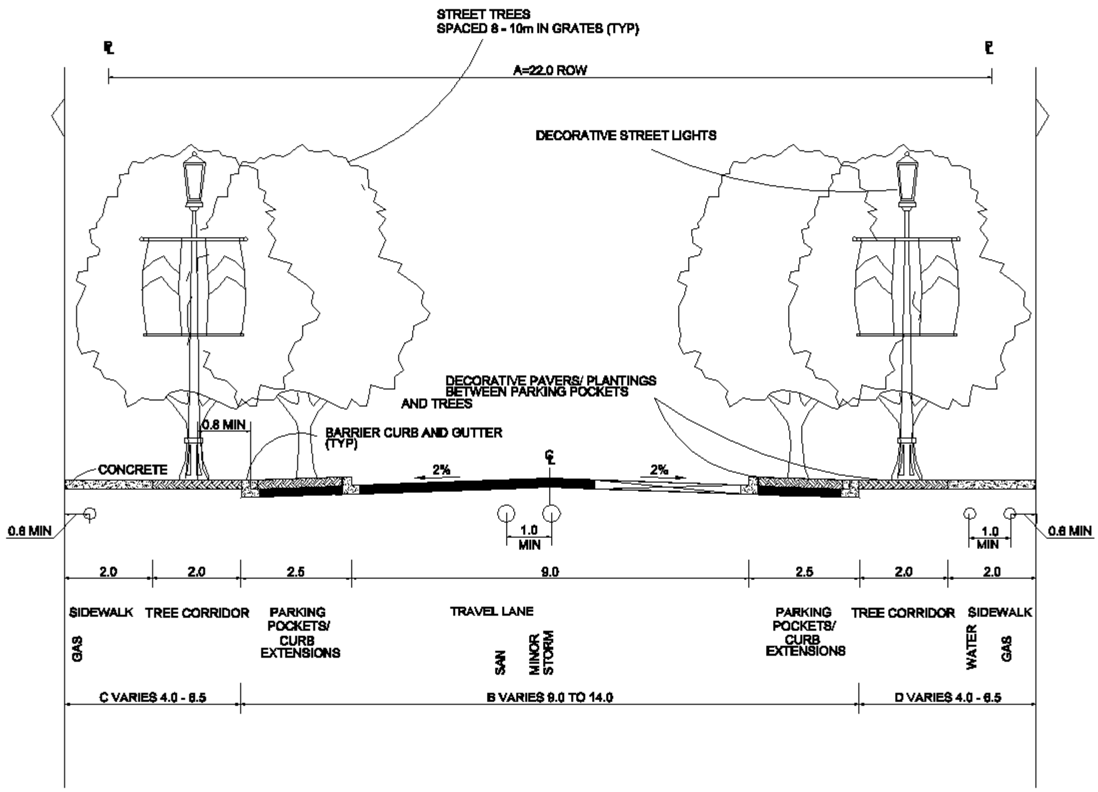
CROSS SECTION : LIVE/ WORK AREA COLLECTOR

Figure A2.6

COLLECTOR	MAJOR	LIVE/ WORK

F



NOTE:
1. HYDRO/TELEPHONE AND CABLE SHOULD GO ON POLES OVERHEAD IN REAR LANES TO AVOID LARGE SURFACE UTILITY FEATURES
2. MINOR STORM SYSTEM WITH CATCH BASINS TO DRAIN ROAD SURFACE ONLY; RUNOFF TO BE DIRECTED TO WET PONDS.

EAST CLAYTON NCP

CROSS SECTION : BUSINESS PARK COLLECTOR

Figure A2.7

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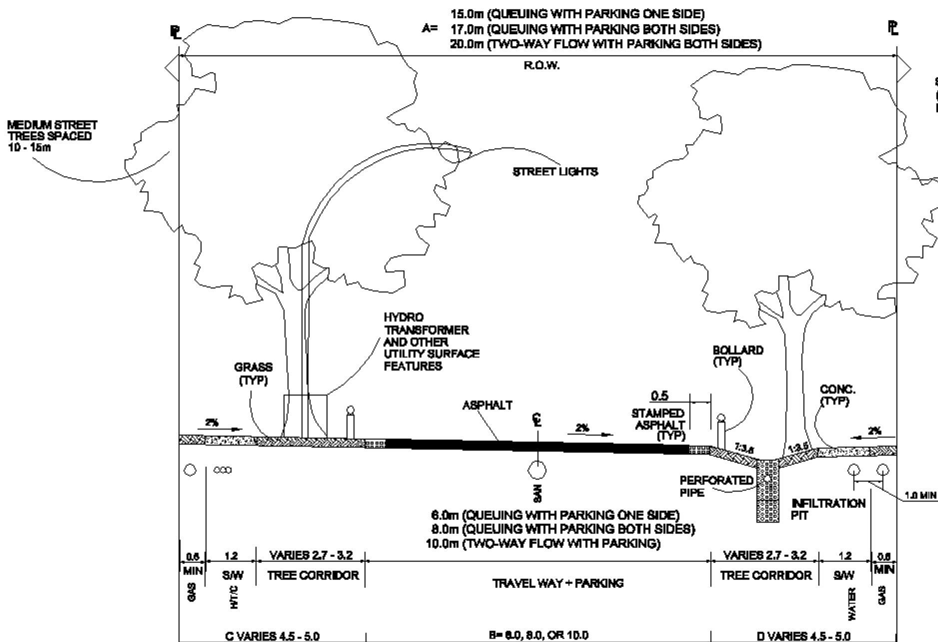
LOCAL	RESIDENTIAL	TWO WAY
		QUEUEING

H



A= 15.0m (QUEUING WITH PARKING ONE SIDE)
17.0m (QUEUING WITH PARKING BOTH SIDES)
20.0m (TWO-WAY FLOW WITH PARKING BOTH SIDES)
R.O.W.
MEDIUM STREET TREES SPACED 10 - 15m
STREET LIGHTS
SMALL/MEDIUM STREET TREE (SPACING SUBJECT TO DRAINAGE REQUIREMENTS)
HYDRO TRANSFORMER AND OTHER UTILITY SURFACE FEATURES
GRASS (TYP)
BOLLARD (TYP)
0.5
ASPHALT
STAMPED ASPHALT (TYP)
CONC. (TYP)
2%
PERFORATED PIPE
INFILTRATION PIT
1.0 MIN
SAN
6.0m (QUEUING WITH PARKING ONE SIDE)
8.0m (QUEUING WITH PARKING BOTH SIDES)
10.0m (TWO-WAY FLOW WITH PARKING)
0.6 MIN
1.2
VARIES 2.7 - 3.2
S/W
TREE CORRIDOR
TRAVEL WAY + PARKING
GAS
H/T/C
WATER
C VARIES 4.5 - 5.0
B= 6.0, 8.0, OR 10.0
D VARIES 4.5 - 5.0

NOTE:

1. IF BLOCK LENGTH > 100m, 6.0m CLEAR WIDTH REQUIRED FOR FIRE TRUCK ACCESS.
2. TREES MUST BE TRIMMED TO ALLOW 4.0m VERTICAL CLEARANCE FOR FIRE TRUCKS
3. BOLLARDS ARE INTENDED TO PREVENT PARKING ON GRASS; ALTERNATIVE METHODS MAY BE POSSIBLE/ PERMITTED.
4. DETAILS OF DRAINAGE FEATURE DESIGN TO BE DETERMINED
5. QUEUING STREET WITH PARKING ONE SIDE SUBJECT TO CITY APPROVAL

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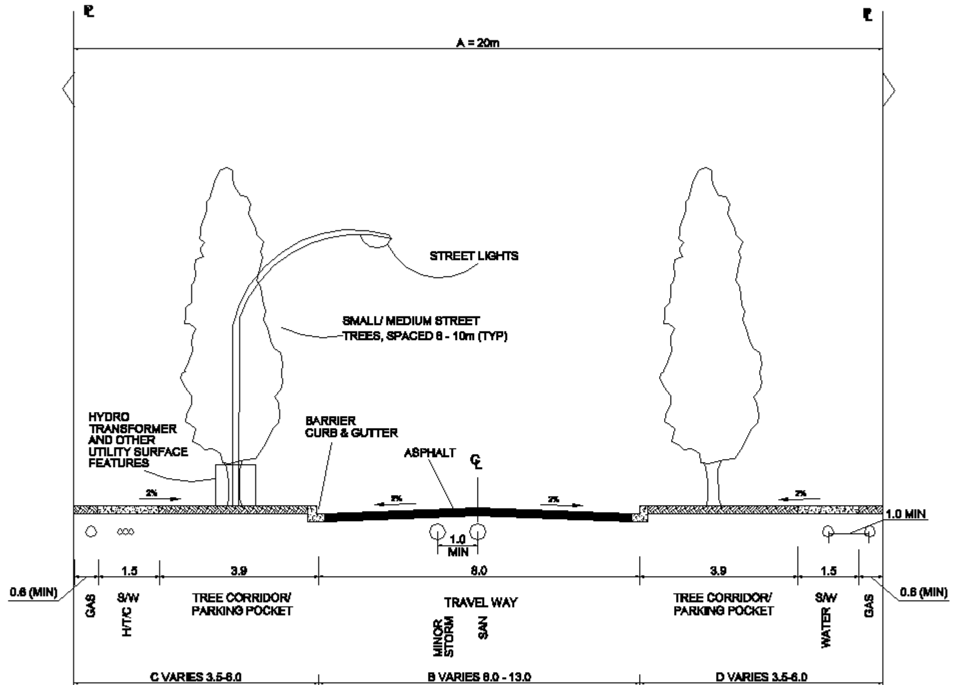
EAST CLAYTON NCP

CROSS SECTIONS : RESIDENTIAL LOCALS

Figure A2.8

LOCAL	COMMERCIAL	BUSINESS PARK

I



NOTE:
1. MINOR STORM SYSTEM WITH CATCH BASINS TO DRAIN ROAD SURFACE ONLY; RUNOFF TO BE DIRECTED TO WET PONDS.
2. VERTICAL CLEARANCE FOR TRUCKS MAY REQUIRE SELECTION OF COLUMNAR- SHAPED TREES AND/ OR PRUNING
3. THIS CROSS SECTION INTENDED FOR USE IN ACCESSING INTERNAL PARKING LOTS OF BUSINESS PARK

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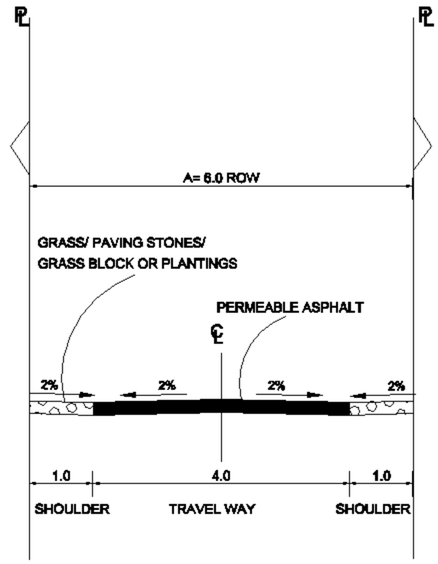
CROSS SECTION : BUSINESS PARK LOCAL

Figure A2.9

LANE	RESIDENTIAL

J



NOTE:
1. PARKING CAN BE PERMITTED IN REAR LANES IN RESIDENTIAL AREAS.
2. A LARGE TRUCK (2.6m) CAN PASS A PARKED CAR WITHOUT THE TRUCK ENCROACHING ONTO THE SHOULDER CAR

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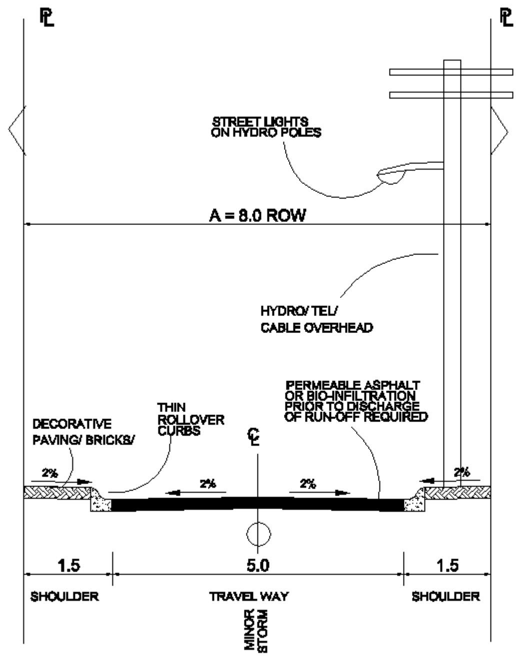
EAST CLAYTON NCP
CROSS SECTION : RESIDENTIAL LANE
Figure A2.10

LANE	COMMERCIAL

K



NOTE:

1. PARKING COULD BE PERMITTED BETWEEN HYDRO POLES/ DRIVEWAYS IN DESIGNATED AREAS SO DECORATIVE PAVING SHOULD BE DESIGNED TO HANDLE WEIGHT OF PARKED CAR.
2. LARGE TRUCKS (2.6m) CAN MANOEVER AROUND PARKED CARS ON BOTH SIDES.
3. REAR PARKING LOTS NOT PERMITTED TO DRAIN TO LANE.
4. MINOR STORM SYSTEM REQUIRED IF PERMEABLE PAVEMENT NOT UTILIZED; RUNOFF TO BE DIRECTED TO WET PONDS.

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EAST CLAYTON NCP

CROSS SECTION : COMMERCIAL LANE

fIGURE A2.11

APPENDIX A.2: EAST CLAYTON
STREET PERFORMANCE STANDARDS

STREET CLASS CHARACTERISTICS		ARTERIALS				
		MAJOR: PARKWAY & RIPARIAN PARKWAY	MAJOR: TYPICAL 4 LANES	MINOR: PARKWAY 2 LANES	MINOR: TYPICAL 2 LANES	MINOR: MAIN STREET
	CROSS SECTION CODE	A	B	A	C	D
A. SERVICE FUNCTIONS AND CHARACTERISTICS						
A.1	**Traffic Volume Ranges**	10,000 to 30,000 vpd; peak direction during peak hour from 1,000 to 1,600 vph	10,000 to 15,000 vpd; peak direction during peak hour from 800 to 1,200 vph	5,000 to 10,000 vpd; peak direction during peak hour from 400 to 800 vph	5,000 to 10,000 vpd; peak direction during peak hour from 400 to 800 vph	5,000 vpd-10,000 vpd; peak direction during peak hour from 400 to 800 vph
A.2	**Flow Characteristics**	uninterrupted two-way flow except at traffic signals, typically spaced no less than 200m apart. Transit stops require pull-outs.	uninterrupted two-way flow except at traffic signals and when parking manoevers occur. Transit stops do not require pull-outs, so that transit operations contribute to traffic "friction" and reduce operating speeds	uninterrupted two-way flow except at traffic signals and when parking manoevers occur. Transit stops in parking lanes; do not require separate pull-outs.	uninterrupted two-way flow except at traffic signals, stop signs and when parking manoevers occur. Transit stops in parking lanes; do not require separate pull-outs	interrupted two-way flow, at signalized/stop controlled intersections, transit stops, mid-block pedestrian crossings and when parking maneovers occur. Transit operations interrupt flow; curb extensions required at bus stops. Major pedestrian zone requires slower operating speeds
A.3	**Access/Intersection Characteristics**	mid-block access to local roads typically via right-in/out only in order to maintain continuous median and improved safety & traffic flows. Left turn bays required at most intersections, whether signalized or not. Rear lanes are preferred for property access; however, frontage roads considered in special circumstances. No direct access permitted	limited mid-block access to local roads permitted, but no left turn bays provided. Rear lanes required for property access. No left turn bays at signalized intersections unless required due to high turning volumes. Rear lanes required for property access. No direct access permitted	mid-block access to local roads permitted via right-in/out only to maintain continuous median. Rear lanes preferred for property access. No direct access permitted; frontage roads considered for special circumstances only.	local road access permitted but left turn bays only provided at major intersections. Rear lanes required for property access. Direct access may be permitted in special circumstances only.	short blocks between 60m and 100m required. No mid-block access to individual properies; rear lanes required. Parallel back access roads/lanes required for adequate circulation and access to rear parking. Left turn bays permitted at Arterial intersections only
A.4	**Design / Operating Speed**	60-70 km/h design speed; operating speed should be 50-60 km/h	60-70 km/h; operating speed should be 40-50 km/h	60-70 km/h; operating speed 40-50 km/h	60-70 km/h; operating speed 40-50 km/h	50 km/h design speed; operating speed design objective is 20-30 km/h to support "pedestrian zone"
A.5	**Frequent User Types**	all user types: passenger vehicles, small and large trucks, transit vehicles, pedestrians, cyclists	all user types: passenger vehicles, small and large trucks, transit vehicles, pedestrians, cyclists	all user types: passenger vehicles, small and large trucks, transit vehicles, pedestrians, cyclists	all user types: passenger vehicles, small and large trucks, transit vehicles, pedestrians, cyclists	major pedestrian zone, with small trucks, some larger delivery trucks, transit,passenger vehicles and pedestrians. Lower numbers of cyclists due to higher traffic volumes/high parking turnover.
A.5a	**Design Vehicle(s) at Intersections**	fire trucks, WB-15 and transit vehicle must be able to make all turns without sweeping into opposing lanes of traffic on Arterials or Collectors (on Locals, 1.0m encroachment is permitted for trucks/fire trucks). Transit vehicles and trucks must be able to make turns without encroaching more than 1.0m into lanes of same-direction flow. Fire trucks can encroach fully into lanes of same-direction flow	fire trucks, WB-15 and transit vehicle must be able to make all turns without sweeping into opposing lanes of traffic on Arterials or Collectors (on Locals, 1.0m encroachment is permitted for trucks/fire trucks). Transit vehicles and trucks must be able to make turns without encroaching more than 1.0m into lanes of same-direction flow. Fire trucks can encroach fully into lanes of same-direction flow	fire trucks, WB-15 and transit vehicle must be able to make all turns without sweeping into opposing lanes of traffic on Arterials or Collectors (on Locals, 1.0m encroachment is permitted for trucks/fire trucks). Transit vehicles and trucks must be able to make turns without encroaching more than 1.0m into lanes of same-direction flow. Fire trucks can encroach fully into lanes of same-direction flow	fire trucks, WB-15 and transit vehicle must be able to make all turns without sweeping into opposing lanes of traffic on Arterials or Collectors (on Locals, 1.0m encroachment is permitted for trucks/fire trucks). Fire trucks can encroach fully into lanes of same-direction flow. Encroachment onto gravel shoulder permitted	WB-15 trucks and transit vehicles should be able to physically negotiate turns at intersections, but only at locations where they are regularly expected to be turning . 1.0m enroachment into sidestreet and main line opposing lanes is allowable since travel lanes are wide, but not for transit vehicles. Emergency vehicles/large trucks permitted to mount curbs at intersections (large, flush curb let-downs possible).
A.5b	**Design Scenario(s) for Travel Way Width**	transit bus (2.6m) or truck (2.6m) passing a car (2.1) travelling in the same direction, and a bicycle (1.0m). Emergency vehicles expected to encroach into same-direction traffic lanes or width for cyclists	transit bus (2.6m) or truck (2.6m) passing a car (2.1) travelling in the same direction, and a bicycle (1.0m). Emergency vehicles expected to encroach into same-direction traffic lanes or width for cyclists	transit bus (2.6m) or truck (2.6m) passing a car (2.1) travelling in the same direction, and a bicycle (1.0m). Emergency vehicles expected to encroach into same-direction traffic lanes or width for cyclists	transit bus (2.6m) or truck (2.6m) passing an oncoming car (2.1) and bicycle (1.0m). Emergency vehicles expected to encroach into same-direction bike lanes/shoulders	transit bus (2.6m) passing a cyclist (1.0m) in one travel lane without encroaching into oncoming traffic. Emergency vehicles expected to encroach into extra width for cyclists. Angle parking also requires wider travel lane for safe backing manoever.
A.6	**Role in Sustainable Drainage Scheme**	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.
		2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets/constructed streams.	2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets.	2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets.	2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets.	2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets.
		3. - where curbs are provided, provide for catchbasins with connection to the drainage swale/pipe system to safely transfer the roadway runoff. Biofiltration to occur prior to discharge into natural stream system	3. - where curbs are provided, provide for catchbasins with connection to the drainage swale/pipe system to safely transfer the roadway runoff. Biofiltration to occur prior to discharge into natural stream system	3. - where curbs are provided, provide for catchbasins with connection to the drainage swale/pipe system to safely transfer the roadway runoff. Biofiltration to occur prior to discharge into natural stream system		3. - where curbs are provided, provide for catchbasins with connection to the drainage swale/pipe system to safely transfer the roadway runoff. Biofiltration to occur prior to discharge into natural stream system

APPENDIX A.2: EAST CLAYTON
STREET PERFORMANCE STANDARDS

STREET CLASS CHARACTERISTICS			ARTERIALS				
			MAJOR: PARKWAY & RIPARIAN PARKWAY	MAJOR: TYPICAL 4 LANES	MINOR: PARKWAY 2 LANES	MINOR: TYPICAL 2 LANES	MINOR: MAIN STREET
CROSS SECTION CODE			A	B	A	C	D
B. CROSS SECTION ELEMENTS							
B.1	**Roadway Features**						
	B.1.1.	**travel lanes**	In Ultimate configuration: two travel lanes in each direction of 3.1m, with 1.3m bike lane. At intersections, 3.0m wide left turn bays. In Interim configuration: one 6.0m paved surface for one 3.5m travel lane and one 2.5m parking lane.	two travel lanes each direction of 3.1m with two 1.3m bike lanes (or two 3.2m inside lanes with two 4.3m outside lanes to allow for cyclists). No marked left turn bays at intersections unless required due to high turning movements at signalized intersections	one travel lane in each direction of 4.5m (wide curb lane for cyclists). At intersections, 3.0m opposing left turn bays. Mid-block left turn bays not permitted	one travel lane in each direction of travel of 3.1m, with painted 1.4m shoulders for cyclists. At intersections, 3.0m opposing left turn bays. Mid-block left turn bays not permitted unless required for traffic/capacity reasons	one travel lane in each direction of 4.3m. Short left turn bays of 3.0m only at major intersections with other Arterials, developed by prohibiting parking.
	B.1.2.	**parking bays/lanes**	parking is not permitted on 4 lane Ultimate Parkways; parking may be permitted with 2 lane Interim configuration, with 2.5m parking lane as noted above.	parking is not permitted	2 continuous 2.5m parking lanes, with pinch points at intersections where no parking permitted or at mid-block crossings, to reduce pedestrian crossing distance	parking permitted on 2.4-3.9m gravel-covered swales	2 continous 45 degree angle 5.7m parking bays, with curb extension at intersections, mid-block crossings and transit stops
	B.1.3	**median width**	varies 2.0m (between intersections) to 4.0m (for 1.0m raised concrete channelization and 3.0m left turn bay at intersections). Median width could be increased to a constant 4.0m width to permit continuous trees, if compensation to property owners for additional right-of-way can be obtained.	none	varies 2.0m (between intersections) to 4.0m (for 1.0m raised concrete channelization and 3.0m left turn bay at intersections). Median width could be increased to a constant 4.0m width to permit continuous trees, if compensation to property owners for additional right-of-way can be obtained.	none	none
	B.1.4	**overland flow path/street runoff**	2% crown drainage to direct overland flow to curb/gutter and catch basins/minor storm sewers, which convey excessive stormwater runoff into designated outfalls and wet ponds. Biofiltration required before discharge into natural streams	2% crown drainage to direct overland flow to curb/gutter and catch basins/minor storm sewers, which convey excessive stormwater runoff into designated outfalls and wet ponds. Biofiltration required before discharge into natural streams	2% crown drainage to direct overland flow to curb/gutter and catch basins/minor storm sewers, which convey excessive stormwater runoff into designated outfalls and wet ponds. Biofiltration required before discharge into natural streams	2% crown drainage to gravel swale/infiltration pits in boulevards on both sides of street	2% crown drainage to direct overland flow to curb/gutter and catch basins/minor storm sewers, which convey excessive stormwater runoff into designated outfalls and wet ponds. Biofiltration required before discharge into natural streams
	B.1.5	**total paved width**	varies 17m (between intersections) to 19m (at intersections, with left turn bays)	usually 15.0m, 18.0m only if left turn bay required due to high traffic volumes	varies 17m (between intersections) to 19m (at intersections, with left turn bays)	varies 9.0m (between intersections) to 12.0m (at intersections with left turn bays)	varies 8.6m to 20m, depending on presence of angled parking
B.2	**Boulevard Features**						
	B.2.1.	**curb type (if present)**	barrier curbs at road edge and at median	barrier curbs at road edge	barrier curbs at road edge and at median	n/a	barrier curbs at road edge
	B.2.2	**sidewalks**	2 concrete 1.5m wide sidewalks located outside of tree corridor. (when a Greenway coincides with Riparian Zone, 3.0m multi-use pathway is included within Riparian Zone and one 1.5m concrete sidewalk can be eliminated)	2 concrete 1.5m wide sidewalks located outside of tree corridor	2 concrete 1.5m wide sidewalks located outside of tree corridor. (when a Greenway coincides with Riparian Zone, 3.0m multi-use pathway is included within Riparian Zone and one 1.5m concrete sidewalk can be eliminated)	2 concrete 1.5m wide sidewalks located outside of tree corridor	2 concrete 2.0m sidewalks located next to property line; it is recommended that an additional 1.0m width be included within the building set-back. Alternative pavement materials can be used, but there must be at least 2.0m clear of brushed concrete for wheelchair users
	B.2.3	**sidewalk/boulevard drainage**	2% slope to curb and gutter	2% slope to curb and gutter	2% slope to curb and gutter	2% slope to gravel drainage swale	2% slope to curb and gutter
	B.2.4	**drainage swale/infiltration pit (if present)**	Interim configuration has 5.0m wide grass swale in median which provides drainage for some of street run-off	n/a	n/a	2.4-2.9m gravel swales/infilatration pits on either side of travel way (combined with parking)	n/a
	B.2.5	**street trees/landscaping**	two street tree corridors on boulevards which vary from 2.2m (with left turn bay) to 3.2m (between intersections). 2.2m allows small trees only, spaced 8-10m apart. 3.2m allows for medium trees which should be spaced 10-12m to achieve good canopy and traffic calming effect. If median widened to 4.0m, small/medium street trees possible throughout median.	two street tree corridors on boulevards which vary from 2.4 (with left turn bay) to 3.9m (between intersections). 2.4m allows small trees only, spaced 8-10m apart. 3.9m allows for medium trees which should be spaced 10-12m to achieve good canopy and traffic calming effect.	two street tree corridors on boulevards which vary from 2.2m (with left turn bay) to 3.2m (between intersections). 2.2m allows small trees only, spaced 8-10m apart. 3.2m allows for medium trees which should be spaced 10-12m to achieve good canopy and traffic calming effect. If median widened to 4.0m, small/medium street trees possible throughout median.	two 3.0m tree corridors for medium street trees. Spacing should be 10-12m	2.0m corridor for small street trees in grates on both sides. Automatic watering system may be required. Spacing should be 8-10m. Additional street trees/landscaping possible in curb extensions at intersections, mid-block crossings, transit stops.
	B2.6	**total boulevard width (one side)**	varies 4.3m to 5.3m depending on presence of left turn bays	varies 4.5m to 6.0m depending on presense of left turn bays	varies 4.3m to 5.3m depending on presence of left turn bays	varies 7.5m to 9.0m depending on presence of left turn bays	varies 4.0-9.7m, depending of presence of angle parking

APPENDIX A.2: EAST CLAYTON
STREET PERFORMANCE STANDARDS

STREET CLASS CHARACTERISTICS				ARTERIALS				
				MAJOR: PARKWAY & RIPARIAN PARKWAY	MAJOR: TYPICAL 4 LANES	MINOR: PARKWAY 2 LANES	MINOR: TYPICAL 2 LANES	MINOR: MAIN STREET
CROSS SECTION CODE				A	B	A	C	D
B.3.	Utilities							
	B.3.1	Location of Underground features						
		B.3.1.1	Storm Sewers (if present)	minor storm water system under road pavement to deal with boulevard and street runoff. Runoff must be directed to wet ponds	minor storm water system under road pavement to deal with boulevard and street runoff. Runoff must be directed to wet ponds	minor storm water system under road pavement to deal with boulevard and street runoff. Runoff must be directed to wet ponds		minor storm water system under road pavement to deal with boulevard and street runoff. Runoff must be directed to wet ponds
		B.3.1.2	Sanitary Sewer line	under road pavement	under road pavement	under road pavement	under road pavement	under road pavement
		B.3.1.3	Water line	under road pavement	under road pavement	under road pavement	under road pavement	under road pavement
		B.3.1.4	Hydro/Tel/Cable lines	under sidewalk (may be overhead on Arterials)	under sidewalk (may be overhead on Arterials)	under sidewalk (may be overhead on Arterials)	under sidewalk (may be overhead on Arterials)	overhead in Commerial lane at rear of Mainstreet buildings
		B.3.1.5	Gas line	under boulevard, at edge of sidewalk	under boulevard, at edge of sidewalk	under boulevard, at edge of sidewalk	under boulevard, at edge of sidewalk	under sidewalk
		B.3.1.6	Street Light Lines	in street tree corridor or under sidewalk	in street tree corridor or under sidewalk	in street tree corridor or under sidewalk	in street tree corridor or under sidewalk	under sidewalk
	B.3.2	Location of Surface features						
		B.3.2.1	Hydro transformers, etc.	in street tree corridor or overhead on poles	in street tree corridor or overhead on poles	in street tree corridor or overhead on poles	in street tree corridor or overhead on poles	overhead in Commerial lane at rear of Mainstreet buildings
		B.3.2.2	Fire hydrants	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m
		B.3.2.3	Street Light Poles	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m
B.4.	Total Road Allowance Width			27.0m (excluding Riparian Zone which is part of the major drainage system, and wider 4.0m median)	27.0m	27.0m (excluding wider 4.0m median)	27.0m	28.0m

APPENDIX A.2: EAST CLAYTON
STREET PERFORMANCE STANDARDS

STREET CLASS CHARACTERISTICS			COLLECTORS			
			MAJOR: RESIDENTIAL	MAJOR: LIVE/WORK	MINOR: BUSINESS PARK	MINOR: RESIDENTIAL
		CROSS SECTION CODE	E	F	G	E
A. SERVICE FUNCTIONS AND CHARACTERISTICS						
	A.1	**Traffic Volume Ranges**	2,000 - 5,000 vpd; peak direction during peak hour from 300 to 600 vph	3,000-6,000 vpd; peak direction during peak hour from 300 to 600 vph	2,000-5,000 vpd; peak direction during peak hour from 300 to 600 vph	1,000 to 3,000 vpd; peak direction during peak hour from 200 to 400 vph
	A.2	**Flow Characteristics**	uninterrupted two-way flow except at traffic signals, stop signs and when parking manoevers occur. Transit stops do not require separate pull-outs	uninterrupted two-way flow except at traffic signals, stop signs and when parking manoevers occur. Transit stops do not require separate pull-outs but do require curb extensions. Major pedestrian zone requires "calmed" traffic	uninterrupted two-way flow except at traffic signals and stop signs, and when parking manoevers occur (limited). Transit stops do not require separate pull-outs	uninterrupted two-way flow except at traffic signals, stop signs and when parking manoevers occur. Transit stops developed by prohibiting parking. If operating speeds are higher than expected, some traffic calming measures would be appropriate, but not those associated with vertical deflection. Refer to Appendix A.3
	A.3	**Access/Intersection Characteristics**	local road access permitted but left turn bays only provided at major intersections. Rear lanes required for property access. Direct access should be limited as much as possible	short blocks bewteen 60m and 100m required. No mid-block access to individual properies; rear lanes required. Parallel back access roads/lanes required for adequate circulation and access to rear parking. Left turn bays only permitted at Arterial intersections	access to local roads permitted. Left turn bays at most intersections/main access points. Direct property access typically not permitted since parking is expected to be in shared, interior lots.	frequent local road access permitted but left turn bays only provided at major intersections, through banning parking. Rear lanes required for property access in most situations. Driveways allowed in special situations but not encouraged since they reduce space for trees. Driveway crossings of drainage feature must be carefully designed not to interrupt surface flow.
	A.4	**Design / Operating Speed**	50 km/h design speed; operating speed design objective is 40 km/h	50 km/h design speed; 20-30 km/h operating speed to support "pedestrian zone"	50 km/h design speed; 40 km/h operating speed	50 km/h design speed; 30 to 40 km/h operating speed
	A.5	**Frequent User Types**	all user types: passenger vehicles, small and large trucks, transit vehicles, pedestrians, cyclists	passenger vehicles, small trucks, transit vehicles, pedestrians, cyclists	small and large trucks, passenger vehicles, transit vehicles. Lower number of pedestrians and cyclists expected	passenger vehicles, small trucks, pedestrians, cyclists
	A.5a	**Design Vehicle(s) at Intersections**	fire trucks, WB-15 and transit vehicle must be able to make all turns without sweeping into opposing lanes of traffic on Arterials or Collectors (on Locals, 1.0m encroachment is permitted for trucks/fire trucks). Fire trucks can encroach fully into lanes of same-direction flow. Encroachment onto gravel shoulder permitted. No encroachment onto grass swale permitted.	WB-15 trucks and transit vehicles should be able to physically negotiate turns at intersections, but only at locations where they are regularly expected to be turning . 0.5m enroachment into opposing lanes is allowable since travel lanes are wide, but not for transit vehicles. Emergency vehicles permitted to mount curbs at intersections (large, flush curb let-downs possible)	fire, WB-15 and transit vehicles must be able to make all turns without sweeping into opposing lanes of traffic. No mounting of curbs permitted except for emergency vehicles.	Garbage/delivery trucks should be able to physically negotiate turns at intersections. Full enroachment into oncoming lanes of intersecting Local street is permitted but not for Arterials or Collectors where no encroachment is permitted. Fire trucks permitted full encroachment into oncoming lanes of all intersecting streets except for Arterials, where fire trucks are only allowed encroachment into same-direction traffic lanes.
	A.5b	**Design Scenario(s) for Travel Way Width**	transit bus (2.6m) or truck (2.6m) passing an oncoming car (2.1) and cyclist (1.0m) at operating speed with parked car on one side. Emergency vehicles expected to encroach into width provided for cyclists	transit bus (2.6m) passing an oncoming truck (2.6m) and cyclist (1.0m) at operating speed with parked cars on either side. Emergency vehicles (3.2m) expected to slightly encroach into space for cyclists but cyclists should be pulled over.	truck (2.6m) passing a transit vehicle or another truck (2.6m) at operating speed with parked car on one side. Note that travel way width must be carefully designed on curves (possibly widened) to allow for sweeping of truck overhangs. Wide curb lanes for cyclists must be "shared" when two large trucks pass.	garbage/delivery truck (2.6m) passing a car (2.1m) moving in the opposite direction, with parked cars both sides. Emergency vehicles (3.2m) expected to slightly encroach into oncoming lane (passenger vehicles should be pulled over). Cyclists expected to be integrated with traffic or take alternative route/rear lane
	A.6	**Role in Sustainable Drainage Scheme**	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.
			2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets.	2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets.	2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets.	2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets.
			3. - where curbs are provided, provide for catchbasins with connection to the drainage swale/pipe system to safely transfer the roadway runoff. Biofiltration to occur prior to discharge into natural stream system			

APPENDIX A.2: EAST CLAYTON
STREET PERFORMANCE STANDARDS

STREET CLASS CHARACTERISTICS			COLLECTORS			
			MAJOR: RESIDENTIAL	MAJOR: LIVE/WORK	MINOR: BUSINESS PARK	MINOR: RESIDENTIAL
CROSS SECTION CODE			E	F	G	E
B. CROSS SECTION ELEMENTS						
B.1	**Roadway Features**					
	B.1.1.	**travel lanes**	one 4.5m travel lane in each direction to allow for bicyclists	one travel lane in each direction of 4.5m to allow for cyclists. Short marked left turn bays only at Arterial intersections, developed by banning parking.	one travel lane in each direction of 4.5m to allow for cyclists. Widens to 12m with with left turn bays at intersections	one 3.35m travel lane in each direction. No marked left turn bays; short space for turning vehicles at intersections made by prohibiting parking.
	B.1.2.	**parking bays/lanes**	parking one side only is permitted in parking pockets delineated by bollards; parking pocket locations to be approved by City - can be on either side of street	parking bays of 2.5m two sides in parking pockets. Pinch points at intersections, mid-block crossings and transit stops	one side limited parking bays. Parking bays should be implemented next to "Live/Work" area only.	two continuous parking lanes of 2.3m. Parking encouraged on-street to increase driver "side friction" and reduce operating speeds. At intersections, parking is prohibited and intersection throat can be "pinched" by reducing pavement width
	B.1.3	**median width**	none	none	4.0m raised concrete median with continuous street trees	none
	B.1.4	**overland flow path/street runoff**	2% crown drainage to swale/infiltration pits in boulevards on both sides of street	2% crown drainage to direct overland flow to curb/gutter and catch basins/minor storm sewers, which convey excessive stormwater runoff into designated outfalls. Biofiltration required before discharge into natural streams	2% cross slope drainage to curb and gutter system which has regular breaks; flow is then channelled to wet ponds on-site. Next to Live/Work area, minor storm system may be required	2% crown drainage to swale/infiltration pits in boulevards on both sides of street
	B.1.5	**total paved width**	11.3m (between intersections; could be less at "pinched" intersection locations)	varies 9.0m to 14.0m	13.0m	11.3m (between intersections, could be less at "pinched" intersection locations)
B.2	**Boulevard Features**					
	B.2.1.	**curb type (if present)**	none	barrier curb	barrier curb, with breaks for runoff. Sidewalk must be constructed over these breaks	n/a
	B.2.2	**sidewalks**	2 concrete 1.5m wide sidewalks located outside of tree corridor	2 concrete 2.0m sidewalks, located outside of tree corridor. In between street trees, decorative pavers/bricks or small plantings can be employed	one 1.5m concrete sidewalk; when next to Live/Work area, sidewalk should be on side of Live/Work	2 concrete 1.5m wide sidewalks located outside of tree corridor. On 70 Avenue Greenway, south side is to have 2.5m sidewalk and double row of trees
	B.2.3	**sidewalk/boulevard drainage**	2% slope to drainage swale/inflitration pit	2% slope to curb and gutter	2% slope to either on-site wet-pond or to breaks in curb & gutter; to be determined during detail design	2% slope to drainage swale/infiltration pit
	B.2.4	**drainage swale/infiltration pit (if present)**	2 grassed 3.25m swales/infiltration pits on either side of road surface. Bollards required to stop drivers parking on grass swale.	n/a	n/a	2 grassed 3.25m swales/infiltration pits on either side of road surface. Bollards required to stop drivers parking on grass swale.
	B.2.5	**street trees/landscaping**	3.35m corridor for trees on both sides shared with drainage swale/infiltration pit. Drainage considerations govern tree type/size/spacing	small street trees in grates on both sides within 2.0m corridor, spaced 8-10m. Automatic watering system may be required.	two 3.0m corridors for medium street trees spaced 10-12m. Only limited parking pockets permitted to minimze loss of tree canopy. 4.0m median for small/medium trees and other landscaping, spaced 10-12m. Vertical clearances for large trucks may require special species/pruning considerations.	two 3.35 corridors for trees shared with drainage swale/infiltration pit. Drainage considerations govern tree type/size/spacing. On 70 Avenue Greenway, an additional 2.0m wide corridor for second row of street trees on south side of street will be provided
	B2.6	**total boulevard width (one side)**	5.35m	varies 4.0m to 6.5m, depending on presence of parking	5.25m on side with sidewalk, 3.75m on side without sidewalk	5.35m (on south side of 70 Avenue Greenway, 8.35m)

APPENDIX A.2: EAST CLAYTON
STREET PERFORMANCE STANDARDS

STREET CLASS CHARACTERISTICS				COLLECTORS			
				MAJOR: RESIDENTIAL	MAJOR: LIVE/WORK	MINOR: BUSINESS PARK	MINOR: RESIDENTIAL
CROSS SECTION CODE				E	F	G	E
B.3.	Utilities						
	B.3.1	Location of Underground features					
		B.3.1.1	Storm Sewers (if present)	n/a	minor storm water system under road pavement to deal with boulevard and street runoff. Runoff must be directed to wet ponds	typically, none. Minor storm water system under road pavement may be to deal with boulevard and street runoff in special circumstances; in this case, runoff must be directed to wet ponds	n/a
		B.3.1.2	Sanitary Sewer line	under road pavement	under road pavement	under road pavement	under road pavement
		B.3.1.3	Water line	under road pavement	under road pavement	under road pavement	under road pavement
		B.3.1.4	Hydro/Tel/Cable lines	under sidewalk	overhead in rear lanes	under sidewalk	under sidewalk
		B.3.1.5	Gas line	under boulevard, at edge of sidewalk	under sidewalk	under boulevard, at edge of sidewalk	under boulevard, at edge of sidewalk
		B.3.1.6	Street Light Lines	in street tree corridor or under sidewalk	under sidewalk	in street tree corridor or under sidewalk	in street tree corridor or under sidewalk
	B.3.2	Location of Surface features					
		B.3.2.1	Hydro transformers, etc.	in street tree corridor	overhead in rear lanes	in street tree corridor	in street tree corridor
		B.3.2.2	Fire hydrants	in street tree corridor but offset from curb at least 0.8m	in street tree corridor, offset at least 0.8m from curb	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m
		B.3.2.3	Street Light Poles	in street tree corridor but offset from curb at least 0.8m	in street tree corridor; setback at least 0.80m from curb.	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m
B.4.	Total Road Allowance Width			22.0m	22.0m	22.0m	22.0m (25.0 m for 70 Avenue Greenway)

APPENDIX A.2: EAST CLAYTON
STREET PERFORMANCE STANDARDS

STREET CLASS CHARACTERISTICS		LOCALS				LANES	
		RESIDENTIAL: TWO-WAY WITH PARKING BOTH SIDES	RESIDENTIAL: QUEUEING WITH PARKING BOTH SIDES	RESIDENTIAL: QUEUING WITH PARKING ONE SIDE	BUSINESS PARK	RESIDENTIAL LANE	COMMERCIAL LANE
	CROSS SECTION CODE	**H**	**H**	**H**	**I**	**J**	**K**
A. SERVICE FUNCTIONS AND CHARACTERISTICS							
A.1	**Traffic Volume Ranges**	500-1,000 vpd	200-500 vpd; if ultimate projected volume is higher, then should use Two-Way flow standard or consider mid-block location for passing	generally <200 vpd, but depends on length of street, land use type and density. Approval required from City for use of this standard	1,000 to 4,000 vpd	varies depending on residential density and length of lane. Should not exceed 200 vpd in most cases	varies depending on type/intensity of commercial land use, location of parking access, and length of lane. Should probably not exceed 1,000 vpd
A.2	**Flow Characteristics**	uninterrupted two-way flow except at traffic signals, stop signs and when parking manoevers occur. On-street parking encouraged to reduce traffic speeds. Traffic calming measures at least every 100m encouraged - all types appropriate	interrupted, queuing operation. Traffic calming measures likely not required, but if they are, all types are appropriate. On-street parking encouraged to reduce speeds	uninterrupted two-way flow, except at stop signs and when parking manoevers occur. On-street parking encouraged to reduce speeds	uninterrupted two-way flow except at stop signs and when parking manoevers occur. On-street parking provided only where necessary in order to maximize trees canopy; most of parking supply should be on interior lots, screened from street. Traffic calming measures which entail horizontal/vertical deflection are not appropriate	interrupted, queuing operation for all vehicles. Traffic calming measures likely not required.	interrupted, queuing operation for any vehicles larger than small/medium passenger cars. Speed humps in commercial lanes appropriate if speeds become too high
A.3	**Access/Intersection Characteristics**	short blocks less than 100m encouraged, with frequent stops/traffic calming measures to reduce operating speeds. Rear lanes required for property access in most situations. Driveway access allowed in special circumstances but not encouraged because they reduce space for trees. Driveway crossings of drainage features must be carefully designed not to interrupt surface flow	short blocks less than 100m encouraged, with frequent stops to reduce operating speeds. If blocks are longer that 100m, parking must be banned on one side for fire truck access. Rear lanes required for property access in most situations. Driveway access allowed in certain circumstances but not encouraged because they reduce space for trees. Driveway crossings of drainage features must be carefully designed not to interrupt surface flow	short blocks less than 100m encouraged, with frequent stops to reduce operating speeds. If blocks are longer that 100m, parking must be banned for fire truck access. Rear lanes required for property access in most situations. Driveway access allowed in special circumstances but not encouraged because they reduce space for trees. Driveway crossings of drainage features must be carefully designed not to interrupt surface flow	access points to interior parking lots and their circulation roads permitted. Left turn bays not required.	frequent access to rear, residential garages permitted	access to rear parking lots of commercial street frontage and rear garages of adjacent residential or live/work permitted
A.4	**Design / Operating Speed**	40 km/h design speed, operating speed design objective is 30 km/h	30 km/h design speed, operating speed design objective is 20-30 km/h	30 km/h design speed, operating speed design objective is 20-30 km/h	40 km/h design speed, operating speed design objective is 30 km/h	20 km/h design speed, operating speed design objective is 10-20 km/h	20 km/h design speed, operating speed design objective is 10-20 km/h
A.5	**Frequent User Types**	garbage vehicles, cars, cyclists, pedestrians	garbage vehicles, cars, cyclists and pedestrians	garbage vehicles, cars, cyclists and pedestrians	small and large trucks, garbage vehicles, cars and pedestrians	garbage vehicles, passenger cars, cyclists and pedestrians	delivery trucks, garbage vehicles, passenger cars, cyclists and pedestrians
A.5a	**Design Vehicle(s) at Intersections**	delivery/garbage vehicles must be able to negotiate intersections with any other road class. Full encroachment into oncoming lanes is allowable at Local/Local intersections but no encroachment permitted at Arterial or Collector intersections. Restriction of parking near intersection may be required to ensure safe manoevers and sight distance	delivery/garbage vehicles must be able to negotiate intersections with any other road class. Full encroachment into oncoming lanes is allowable at Local/Local intersections but no encroachment permitted at Arterial or Collector intersections. Restriction of parking near intersection may be required to ensure safe manoevers and sight distance	delivery/garbage vehicles must be able to negotiate intersections with any other road class. Full encroachment into oncoming lanes is allowable at Local/Local intersections but no encroachment permitted at Arterial or Collector intersections. Restriction of parking near intersection may be required to ensure safe manoevers and sight distance	Large trucks must be able to make all turns without encroaching more than 1.0m into opposing lanes of traffic on local road. Emergency vehicles can fully encroach into opposing lanes	delivery/garbage vehicles must be able to negotiate intersections with any other road class. Full encroachment into oncoming lanes is allowable at Local intersections but no encroachment permitted at Arterial or Collector intersections. Restriction of parking in rear lane near intersection may be required to ensure safe manoevers and sight distance	delivery/garbage vehicles must be able to negotiate intersections with any other road class. Full encroachment into oncoming lanes is allowable at Local intersections but no encroachment permitted at Arterial or Collector intersections. Restriction of parking in rear lane near intersection may be required to ensure safe manoevers and sight distance
A.5b	**Design Scenario(s) for Travel Way Width**	two cars (2.1m) passing each another slowly with parking one side. Fire trucks expected to encroach into oncoming lanes. Cyclists integrated with traffic	car (2.1m) passing an oncoming cyclist (1.0m) slowly, next to parked cars on both sides. Fire trucks not expected unless block is longer than 100m, in which case parking will be banned one side to achieve 6.0m clear. Cyclists integrated with traffic	car (2.1m) passing a cyclist (1.0m) slowly next to a parked car on one side. Fire trucks not expected unless block is longer than 100m, in which case parking will be banned one side to achieve 6.0m clear. Cyclists integrated with traffic	two large trucks (2.6m) passing one another at operating speed. Cyclists are not expected frequently, but if present, will be integrated with traffic	truck (2.6m) slowly passing a parked car (which is partly pulled over onto lane "shoulder") Cyclists integrated with traffic	two passenger cars (2.1m) passing each other slowly opposite a parked car, or truck (2.6m) passing a parked car slowly. Cyclists integrated with traffic
A.6	**Role in Sustainable Drainage Scheme**	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.	1. - be part of the overland flow path (major system) to safely convey stormwater runoff and to designated discharge location such as ponds, outfalls etc.
		2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets.	2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets.	2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets.	2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets.	2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets.	2. - where required by the grading plan designs of developments, effectively transfer all cross flows to drainage swales/inlets.
							3. - where curbs are provided, provide for catchbasins with connection to the drainage swale/pipe system to safely transfer the roadway runoff. Biofiltration to occur prior to discharge into natural stream system

APPENDIX A.2: EAST CLAYTON
STREET PERFORMANCE STANDARDS

STREET CLASS CHARACTERISTICS			LOCALS				LANES	
			RESIDENTIAL: TWO-WAY WITH PARKING BOTH SIDES	RESIDENTIAL: QUEUEING WITH PARKING BOTH SIDES	RESIDENTIAL: QUEUING WITH PARKING ONE SIDE	BUSINESS PARK	RESIDENTIAL LANE	COMMERCIAL LANE
CROSS SECTION CODE			H	H	H	I	J	K
B. CROSS SECTION ELEMENTS								
B.1	**Roadway Features**							
	B.1.1.	**travel lanes**	two travel lanes of 3.0m	1 shared travel lane of 4.0m	1 shared travel lane of 4.0m	two travel lanes of 4.0m each	one shared travel lane of 4.0m	one shared travel lane of 5.0m
	B.1.2.	**parking bays/lanes**	two continuous parking lanes of 2.0m	two continuous parking lanes of 2.0m	one continuous parking lane of 2.0m	limited parking bays of 2.5m permitted within street tree corridor	none	no parking lane but parking permitted on "shoulders" in locations defined by hard surfaces (paving stones, bricks, asphalt)
	B.1.3	**median width**	none	none	none	none	none	none
	B.1.4	**overland flow path/street runoff**	2% cross fall drainage to swale/infiltration pit in boulevards on one side of street	2% cross fall drainage to swale/infiltration pit in boulevards on one side of street	2% cross fall drainage to swale/infiltration pit in boulevards on one side of street	2% crown drainage to direct overland flow to curb/gutter and catch basins/minor storm sewers, which convey excessive stormwater runoff into designated outfalls. Biofiltration required before discharge into natural streams	dish drainage with permeable pavement. Lot drainage should not drain to lanes unless sub-surface drainage system provided.	2% crown drainage to direct overland flow to curb/gutter and catch basins/minor storm sewers, which convey excessive stormwater runoff into designated outfalls and wet ponds. Bio-filtration required before discharge into natural streams.
	B.1.5	**total paved width**	10.0m	8.0m	6.0m	8.0m	4.0m	5.0m
B.2	**Boulevard Features**							
	B.2.1.	**curb type (if present)**	n/a	n/a	n/a	barrier	n/a	thin rollover curbs
	B.2.2	**sidewalks**	2 concrete 1.2m wide sidewalks located outside of tree corridor	2 concrete 1.2m wide sidewalks located outside of tree corridor	2 concrete 1.2m wide sidewalks located outside of tree corridor	2 concrete 1.5m wide sidewalks located outside of tree corridor	n/a, although pedestrians can use "shoulder" as refuge when vehicles are present	n/a, although pedestrians can use slightly raised "shoulder" as refuge when vehicles are present
	B.2.3	**sidewalk/boulevard drainage**	2% slope to drainage swale/infiltration pit	2% slope to drainage swale/infiltration pit	2% slope to drainage swale/infiltration pit	2% slope to curb and gutter	2% sloped "shoulders" drain to permeable pavement	2% sloped "shoulders" drain to curb and gutter
	B.2.4	**drainage swale/infiltration pit (if present)**	one 3.2m swale/infiltration pit. Bollards required on both sides to stop drivers parking on grass	one 2.7m swale/infiltration pit. Bollards required on both sides to stop drivers parking on grass	one 2.7m swale/infiltration pit. Bollards required on both sides to stop drivers parking on grass	n/a	n/a	n/a
	B.2.5	**street trees/landscaping**	one 3.2m street tree corridor for small to medium trees on side without swale. On side with swale, street tree type/size/spacing will be dependent of swale/infiltration design. Perforations in infiltration pipe discontinued adjacent to tree to avoid saturated soil conditions	one 2.7m street tree corridor for small to medium trees on side without swale. On side with swale, street tree type/size/spacing will be dependent of swale/infiltration design Perforations in infiltration pipe discontinued adjacent to tree to avoid saturated soil conditions	one 2.7m street tree corridor for small to medium trees on side without swale. On side with swale, street tree type/size/spacing will be dependent of swale/infiltration design. Perforations in infiltration pipe discontinued adjacent to tree to avoid saturated soil conditions	two 3.9m corridors for street trees/ shared with parking pockets. Minimize parking to minimize loss of street tree canopy.	n/a	n/a
	B2.6	**total boulevard width (one side)**	5.0m	4.5m	4.5m	6.0m	1.0m	1.5m

APPENDIX A.2: EAST CLAYTON
STREET PERFORMANCE STANDARDS

STREET CLASS CHARACTERISTICS				LOCALS				LANES	
				RESIDENTIAL: TWO-WAY WITH PARKING BOTH SIDES	RESIDENTIAL: QUEUEING WITH PARKING BOTH SIDES	RESIDENTIAL: QUEUING WITH PARKING ONE SIDE	BUSINESS PARK	RESIDENTIAL LANE	COMMERCIAL LANE
CROSS SECTION CODE				H	H	H	I	J	K
B.3.	**Utilities**								
	B.3.1	**Location of Underground features**							
		B.3.1.1	**Storm Sewers (if present)**	n/a	n/a	n/a	minor storm water system under road pavement to direct water from median curb and gutter to bio-filtration stream/ponds in business park	n/a	minor storm water system under road pavement to deal with boulevard and street runoff. Runoff must be directed to wet ponds
		B.3.1.2	**Sanitary Sewer line**	under road pavement	under road pavement	under road pavement	under road pavement	n/a	n/a
		B.3.1.3	**Water line**	under road pavement	under road pavement	under road pavement	under road pavement	n/a	n/a
		B.3.1.4	**Hydro/Tel/Cable lines**	under sidewalk	under sidewalk	under sidewalk	under sidewalk	n/a	overhead on poles
		B.3.1.5	**Gas line**	under boulevard, at edge of sidewalk	under boulevard, at edge of sidewalk	under boulevard, at edge of sidewalk	under boulevard, at edge of sidewalk	n/a	n/a
		B.3.1.6	**Street Light Lines**	in street tree corridor or under sidewalk	in street tree corridor or under sidewalk	in street tree corridor or under sidewalk	in street tree corridor or under sidewalk	n/a	street lighting provided in Commercial lanes on hydro poles
	B.3.2	**Location of Surface features**							
		B.3.2.1	**Hydro transformers, etc.**	in street tree corridor	in street tree corridor	in street tree corridor	in street tree corridor	n/a	overhead on poles
		B.3.2.2	**Fire hydrants**	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m	n/a	n/a
		B.3.2.3	**Street Light Poles**	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m	in street tree corridor but offset from curb at least 0.8m	n/a	street lighting provided in Commercial lanes on hydro poles
B.4.	**Total Road Allowance Width**			20.0m	17.0m	15.0m	20.0m	6.0m	8.0m

APPENDIX A.3
APPROPRIATE APPLICATION OF TRAFFIC CALMING MEASURES

TYPE	MEASURE	APPROPRIATE APPLICATION				
		LOCAL ROADS		MINOR COLLECTOR ROADS		ARTERIAL & MAJOR COLLECTOR ROADS
		WITH CURBS	WITHOUT CURBS	WITH CURBS	WITHOUT CURBS	WITH CURBS
VERTICAL SHIFT (Primary Measures)						
	Raised Crosswalk	✔				
	Plateaus or Raised Intersections	✔				
	Rumble Strips	✔	✔	✔	✔	
	Sidewalk Extension	✔	✔	✔(1)	✔(1)	
	Speed Humps / Cushions	✔				
HORIZONTAL SHIFT (Primary Measures)						
	Chicane	✔				
	Curb Extension	✔		✔		
	Curb Radius Reduction	✔	✔	✔(2)	✔(2)	
	On-Street Parking	✔	✔	✔	✔	
	Raised Median Island	✔	✔	✔	✔	✔
	Traffic Circle	✔				
	Roundabout			✔		
OBSTRUCTION (Primary Measures)						
	Directional Closure	✔	✔			
	Diverter	✔	✔	✔	✔	
	Full Closure	✔	✔			
	Raised Intersection Channelization	✔	✔	✔	✔	✔
	Raised Median Through Intersection	✔	✔	✔	✔	

TYPE	MEASURE	APPROPRIATE APPLICATION				
		LOCAL ROADS		MINOR COLLECTOR ROADS		ARTERIAL & MAJOR COLLECTOR ROADS
		WITH CURBS	WITHOUT CURBS	WITH CURBS	WITHOUT CURBS	WITH CURBS
	Right-in/out Island	✔	✔			
SIGNING (Secondary Measures)						
	Maximum Speed Sign	✔	✔	✔	✔	
	Right/Left Turn Prohibition Sign	✔	✔	✔	✔	✔
	One-Way Sign	✔	✔			
	Stop Sign	✔	✔	✔(3)	✔(3)	
	Through Traffic Prohibited Sign	✔	✔			
	Traffic-Calmed Neighbourhood Sign	✔	✔	✔	✔	
	Yield Sign	✔	✔			
PAVEMENT TREATMENT (Secondary Measures)						
	Special Surfaces (colours, textures)	✔	✔	✔	✔(4)	✔(4)
	Road Markings	✔	✔	✔	✔	✔
SUPPORTING ENVIRONMENTAL FEATURES (Secondary Measures)						
	Landscaping	✔	✔	✔	✔	✔
	Entrance Details	✔	✔	✔	✔	

Notes:

The information contained in this table is based upon research and engineering judgement of Reid Crowther & Partners Ltd. and does not represent City of Surrey policy, or the policies of any other jurisdiction/industry publication.

(1) appropriate only if sidewalk extension is flush with road surface, i.e., not on a raised platform or flat-top hump
(2) must be individually reviewed to ensure larger vehicles on major collectors can perform turning manoevers without sweeping into opposing lanes on Major Collector
(3) subject to traffic analysis
(4) appropriate in boulevard or sidewalk crossings only

APPENDIX B

B.1 Proposed East Clayton Sanitary Sewer System Design Calculations

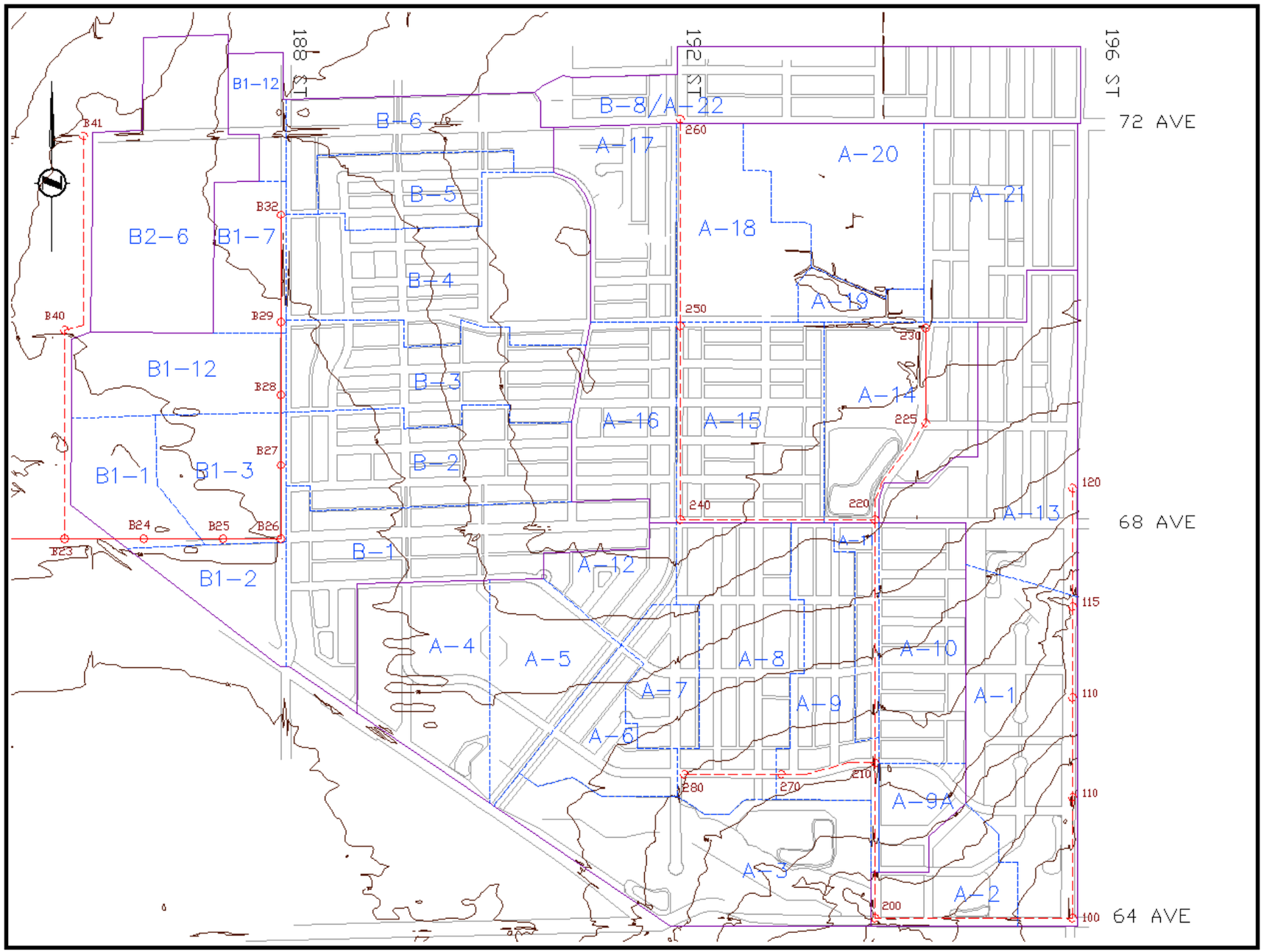
Appendix B.1 - Clayton Proposed Sanitary Trunk System Based on Peak Flows

Average Flow Per Person 350 l/day
Infiltration 0.1 l/ha

Conduit	Upstream Node	Downstream Node	New Contributing Areas				Tributary Population	Tributary Area (ha)	Average Qdaily (l/day)		>3.8	<2.5	Harman Peaking Factor	Qdaily peak (l/s)	Qinfil (l/s)	Qtotal (l/s)	Upstream Ground (m)	Upstream Invert (m)	Downstream Ground (m)	Downstream Invert (m)	Length (m)	Slope	Diameter (mm)	Velocity (m/s)	Qdesign (l/s)	Q/Qd
120	120	115	A-13	-	-	-	981	13.9	343479	4.39986265	3.8	4.39986265	3.80	15.1	1.4	16.5	63.38	62.00	51.11	49.48	244.7	0.051	150	1.95	34.4	0.48
115	115	110	-	-	-	-	981	13.9	343479	4.39986265	3.8	4.39986265	3.80	15.1	1.4	16.5	51.11	49.48	46.36	45.22	201.6	0.021	200	1.52	47.7	0.35
110	110	105	A-1	-	-	-	2406	27.7	842145	4.36016408	3.8	4.36016408	3.80	37.0	2.8	39.8	46.36	45.22	36.53	34.95	183.8	0.056	200	2.47	77.5	0.51
105	110	100	-	-	-	-	2406	27.7	842145	4.36016408	3.8	4.36016408	3.80	37.0	2.8	39.8	36.53	34.95	31.70	30.20	239.3	0.020	250	1.71	83.8	0.48
260	260	250	A-17	A-22	-	-	1161	23.2	406412	3.75721961	3.75721961	3.75721961	3.76	17.7	2.3	20.0	83.50	82.00	83.00	81.00	419.5	0.002	250	0.59	29.0	0.69
250	250	240	A-16	-	-	-	1536	30.6	537452	3.67217185	3.67217185	3.67217185	3.67	22.8	3.1	25.9	83.00	81.00	81.50	80.00	391.2	0.003	250	0.61	30.1	0.86
240	240	220	A-15	-	-	-	2350	42.7	822506	3.5302836	3.5302836	3.5302836	3.53	33.6	4.3	37.9	81.50	80.00	75.00	70.50	393.8	0.024	250	1.88	92.4	0.41
230	230	225	A-18	A-19	A-20	A-21	5872	74.4	2055219	3.17958809	3.17958809	3.17958809	3.18	75.6	7.4	83.1	**80.13**	**75.15**	**78.00**	**72.18**	191.8	**0.015**	**375**	1.98	218.2	0.38
225	225	220	A-14	-	-	-	6520	85.0	2282005	3.13628524	3.13628524	3.13628524	3.14	82.8	8.5	91.3	**78.00**	**72.18**	75.00	70.50	185.6	0.009	375	1.51	166.8	0.55
220	220	210	A-11	A-10	-	-	7733	96.0	2706641	3.06463066	3.06463066	3.06463066	3.06	96.0	9.6	105.6	75.00	70.50	55.00	53.50	491.7	0.035	375	2.95	326.0	0.32
290	290	280	A-4	A-5	A-12	A-6	2067	25.0	723281	3.57469417	3.57469417	3.57469417	3.57	29.9	2.5	32.4	68.00	66.50	61.00	59.50	283.8	0.025	250	1.90	93.4	0.35
280	280	270	A-8	A-7	-	-	3363	41.0	1177200	3.39973991	3.39973991	3.39973991	3.40	46.3	4.1	50.4	61.00	59.50	56.50	54.50	196.1	0.025	300	2.18	154.4	0.33
270	270	210	A-9	-	-	-	3974	48.7	1390798	3.33589644	3.33589644	3.33589644	3.34	53.7	4.9	58.6	56.50	54.50	55.00	53.50	192.5	0.005	375	1.14	126.4	0.46
210	210	200	A-9A	-	-	-	12167	147.7	4258558	2.86961642	2.86961642	2.86961642	2.87	141.4	14.8	156.2	55.00	53.50	40.00	38.50	314.1	0.048	525	4.34	939.8	0.17
200	200	100	A-2	A-3	-	-	13172	168.3	4610201	2.83502459	2.83502459	2.83502459	2.84	151.3	16.8	168.1	40.00	38.50	31.70	30.20	399.6	0.021	525	2.86	619.8	0.27
B1-51	B41	B40	B2-6	-	-	-	1160	14.2	405998	3.75751732	3.75751732	3.75751732	3.76	17.7	1.4	19.1	67.00	65.8	66.0	64.3	400.0	0.00	250	0.74	36.4	0.52
B1-52	B40	B23	-	-	-	-	1160	14.2	405998	3.75751732	3.75751732	3.75751732	3.76	17.7	1.4	19.1	66.00	64.3	64.3	61.1	425.0	0.01	250	1.05	51.6	0.37
B1-10	B32	B29	B2-7a	B-6	B-5	-	1292	14.8	452172	3.7255242	3.7255242	3.7255242	3.73	19.5	1.5	21.0	72.00	70.00	69.60	66.40	200.0	0.018	200	1.40	44.0	0.48
	Conduits B1-12e, B1-14e, B1-15e, B1-16e, B1-17e, B1-18e, and B1-19e are part of the existing sanitary sewer system (as per Coastland Engineering Asbuilts 7895-0205-00)																									
B1-12e	B29	B28	B1-7	B-4	-	-	2106	34.9	737084	3.56824614	3.56824614	3.56824614	3.57	30.4	3.5	33.9	**69.43**	**66.29**	**67.51**	**64.45**	**130.6**	**0.014**	**300**	1.62	114.5	0.30
B1-14e	B28	B27	B1-12	B-3	-	-	3300	52.2	1155002	3.40690786	3.40690786	3.40690786	3.41	45.5	5.2	50.8	**67.51**	**64.44**	**66.69**	**63.67**	**156.15**	**0.005**	**300**	0.97	68.4	0.74
B1-15e	B27	B26	B1-3	B-2	-	-	5211	68.9	1823971	3.22829258	3.22829258	3.22829258	3.23	68.2	6.9	75.0	**66.69**	**63.66**	**66.10**	**62.99**	**134.65**	**0.005**	**300**	0.96	68.2	1.10
B1-16e	B26	B25	B-1	-	-	-	6619	82.2	2316756	3.12999005	3.12999005	3.12999005	3.13	83.9	8.2	92.2	**66.10**	**62.99**	**64.39**	**62.15**	**150.9**	**0.005**	**375**	1.12	123.8	0.74
B1-17e	B25	B24	-	-	-	-	6619	82.2	2316756	3.12999005	3.12999005	3.12999005	3.13	83.9	8.2	92.2	**64.39**	**62.14**	**64.48**	**61.32**	**149.4**	**0.005**	**375**	1.12	124.1	0.74
B1-18e	B24	B23	B1-2	-	-	-	7464	86.4	2612531	3.07958865	3.07958865	3.07958865	3.08	93.1	8.6	101.8	**64.48**	**61.29**	**64.21**	**60.79**	**97.75**	**0.005**	**375**	1.12	124.1	0.82
B1-19e	B23	B22	B1-1	-	-	-	8696	105.3	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7	**64.21**	**60.72**	**63.97**	**59.59**	**105.6**	**0.005**	**375**	1.13	124.4	0.94
B1-20	B22	B21	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7	63.97	59.47	61.00	56.90	380	0.007	375	1.34	147.8	0.79
	Conduits B1-21e through B1-40e are part of the existing sanitary sewer system (as per HY Engineering Asbuilts)																									
B1-21e	B21	B20	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**56.93**		**55.90**	**95.9**	**0.011**	**375**	1.65	181.7	0.64
B1-22e	B20	B19	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**55.92**		**52.82**	**95.8**	**0.032**	**375**	2.86	315.4	0.37
B1-23e	B19	B18	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**52.82**		**48.20**	**139.1**	**0.033**	**375**	2.89	319.5	0.37
B1-24e	B18	B17	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**48.20**		**46.73**	**49.5**	**0.030**	**375**	2.74	302.3	0.39
B1-25e	B17	B16	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**46.70**		**43.85**	**98.6**	**0.029**	**375**	2.70	298.1	0.39
B1-26e	B16	B15	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**43.85**		**40.66**	**95.0**	**0.034**	**375**	2.91	321.3	0.36
B1-27e	B15	B14	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**40.63**		**36.83**	**74.3**	**0.051**	**375**	3.59	396.5	0.29
B1-28e	B14	B13	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**36.83**		**32.46**	**98.1**	**0.045**	**450**	3.78	601.8	0.19
B1-29e	B13	B12	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**32.46**		**28.52**	**58.5**	**0.067**	**450**	4.65	739.8	0.16
B1-30e	B12	B11	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**28.52**		**26.57**	**99.1**	**0.020**	**450**	2.51	399.9	0.29
B1-31e	B11	B10	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**26.57**		**25.84**	**100.7**	**0.007**	**450**	1.53	242.7	0.48
B1-32e	B10	B9	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**25.84**		**24.86**	**38.2**	**0.026**	**450**	2.87	456.7	0.26
B1-33e	B9	B8	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**24.86**		**23.56**	**5.6**	**0.233**	**450**	8.65	1376.1	0.08
B1-34e	B8	B7	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**23.6**		**20.0**	**62.8**	**0.06**	**450**	4.31	685.2	0.17
B1-35e	B7	B6	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**20.0**		**16.9**	**72.1**	**0.04**	**450**	3.69	586.4	0.20
B1-36e	B6	B5	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**16.9**		**14.5**	**76.5**	**0.03**	**450**	3.19	507.1	0.23
B1-37e	B5	B4	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**14.3**		**9.0**	**144.4**	**0.04**	**450**	3.41	542.6	0.22
B1-38e	B4	B3	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**9.0**		**6.6**	**47.5**	**0.05**	**450**	4.07	647.5	0.18
B1-39e	B3	B2	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**6.9**		**4.8**	**44.0**	**0.05**	**750**	5.45	2408.9	0.05
B1-40e	B2	B1	-	-	-	-	8696	105	3043609	3.0147066	3.0147066	3.0147066	3.01	106.2	10.5	116.7		**4.8**		**1.2**	**112.2**	**0.03**	**750**	4.51	1991.7	0.06

TOTAL POPULATION SERVICED 24274

Bold Indicates Information from Asbuilts



Project:

City of Surrey

East Clayton NCP

Major Sanitary Catchment Boundary

Sanitary SubCatchment Boundary

5m Contour

Existing Sanitary Trunk Sewer

Future Sanitary Sewer

120 Sanitary Sewer Node ID

Not to Scale

Reid Crowther

Title:

City of Surrey

Appendix B.2

Proposed Clayton Sanitary Sewer System Schematic

APPENDIX C

C.1 Rational Method Design Calculations - With Deep Injection Wells

C.2 Rational Method Design Calculations - No Deep Injection Wells

Appendix C.1- Rational Method Design Calculations - With Deep Injection Wells

(see Figure 6.5.2 for node schematic)

Project #: 4E+06
Calcs By : JRA
Checked :
Date : July 27, 2000

Client Name: City of Surrey
Project Name: Clayton NCP
Drainage Area: East Clayton
Design Storm: 5 Year Design Event - With Deep Injection Wells

Remarks:

LOCATION			AREA			DESIGN FLOW										PIPE DATA					
									Time of Concentration			Minor System									
Street/ Right of Way	From MH	To MH	Incremental Area Code	Land Use Description	Incremental Area A (ha)	Runoff Coeff. R	Incremental A*R	Total A*R	To Entry (min)	Critical Time (min)	In Pipe Section (min)	Rainfall Intensity (mm/hr)	Total Flow (m3/s)	Deep Well Infiltration Flow (m3/s)	Net Pipe Flow (m3/s)	Pipe Capacity (m3/s)	Friction Factor n	Pipe Slope (%)	Actual Pipe Diameter (m)	Pipe Length (m)	Full Velocity (m/s)
								0.000		0.00											
	A200	A190	A-12		40.360	0.410	16.548	16.548	15.000	22.00	0.28	24.8	1.140	0.450	**0.690**	0.922	0.013	4.6%	0.525	205.0	3.851
	A190	A180	A-11		16.610	0.410	6.810	23.358	15.000	22.28	0.38	24.6	1.597	0.310	**0.837**	1.189	0.013	3.8%	0.600	235.0	4.205
	A210	A180	A-10		26.630	0.410	10.918	34.276	15.000	22.67	0.53	24.4	2.325	0.490	**1.075**	1.447	0.013	5.6%	0.600	400.0	5.119
	A180	A170	POND P-6												**0.860**	1.005	0.013	12.4%	0.450	485.0	6.319
	A170	A100	-												**0.860**	1.053	0.013	13.6%	0.450	310.0	6.620
	A160	A150	A-7		13.290	0.410	5.449	5.449	15.000	15.00	0.29	30.8	0.466		**0.466**	0.475	0.013	7.3%	0.375	255.0	4.299
	A150	A130	A-6		8.870	0.410	3.637	9.086	15.000	15.29	0.13	30.5	0.769		**0.769**	0.843	0.013	8.8%	0.450	115.0	5.303
	A140	A130	A-5		6.520	0.410	2.673	11.759													
			A-4		9.070	0.410	3.719	15.478	15.000	15.00	0.35	30.8	1.324		**1.324**	1.381	0.013	1.5%	0.750	190.0	3.126
	A130	A120	A-3		14.960	0.410	6.134	21.611	15.000	15.35	0.03	30.4	1.825		**1.825**	4.312	0.013	15.0%	0.750	65.0	9.760
	A110	A100	POND P-4												**0.890**	1.360	0.013	10.0%	0.525	155.0	6.282
	A240	A230	A-8		16.930	0.800	13.544	13.544	15.000	15.00	0.27	30.8	1.159		**1.159**	1.574	0.013	2.0%	0.750	450.0	3.564
	A230	A220	POND P-2		16.930										**0.170**	0.250	0.013	6.7%	0.300	495.0	3.532
	A220	A100	POND P-1,2		25.730										**0.150**	0.328	0.013	11.5%	0.300	440.0	4.647
	A100	OFFSITE	-			0.000	0.000	0.000	15.000	15.00		30.8	0.000		**0.000**	0.000	0.013		0.200	400.0	0.000
	B150	B140	B-5		12.580	0.460	5.787	5.787	15.000	15.00	0.43	30.8	0.495	0.100	**0.395**	0.521	0.013	3.3%	0.450	225.0	3.273
	B140	B130	-			0.000	0.000	5.787	15.000	15.43	0.38	30.4	0.488		**0.388**	0.638	0.013	5.0%	0.450	215.0	4.008
	B160	B130	B-4		15.910	0.460	7.319	7.319	15.000	15.81	0.34	30.0	0.610	0.350	**0.260**	0.405	0.013	5.3%	0.375	230.0	3.666
	B130	B120	-			0.000	0.000	13.105	15.000	16.15	0.28	29.6	1.079		**0.629**	0.638	0.013	5.0%	0.450	185.0	4.008
	B170	B120	B-3		7.930	0.460	3.648	3.648	15.000	16.43	0.00	29.4	0.298	0.290	**0.008**	0.000	0.013	5.6%	0.000	235.0	0.000
	B120	B110	-			0.000	0.000	16.753	15.000	16.43	0.37	29.4	1.367		**0.637**	0.868	0.013	2.0%	0.600	155.0	3.071
	B180	B110	B-2		11.530	0.460	5.304	5.304	15.000	16.80	0.38	29.1	0.429	0.290	**0.139**	0.392	0.013	5.0%	0.375	240.0	3.550
	B200	B190	B-1		13.070	0.800	10.456	10.456	15.000	17.18	0.34	28.7	0.835	0.340	**0.495**	0.713	0.013	6.3%	0.450	240.0	4.482
	B190	B110	-			0.000	0.000	10.456	15.000	17.51	0.27	28.5	0.827		**0.487**	0.514	0.013	1.4%	0.525	95.0	2.375
	B110	B100	-			0.000	0.000	32.513	15.000	17.78	0.49	28.2	2.550		**1.262**	1.331	0.013	1.4%	0.750	125.0	3.012
	B100	OFFSITE													**0.880**	1.005	0.013	1.4%	0.675	125.0	2.808

Bold Indicates Specified Pond Release Rate

Appendix C.2 - Rational Method Design Calculations - No Deep Injection Wells

(see Figure 6.5.2 for node schematic)

Project #: 4E+06
Calcs By : JRA
Checked :
Date : July 28, 2000

Client Name: City of Surrey
Project Name: Clayton NCP
Drainage Area: East Clayton
Design Storm: 5 Year Design Event - No Deep Injection Wells

Remarks:

LOCATION			AREA			DESIGN FLOW									PIPE DATA					
									Time of Concentration			Minor System								
Street/ Right of Way	From MH	To MH	Increment Area Code	Land Use Description	Increment Area A (ha)	Runoff Coeff. R	Increment A*R	Total A*R	To Entry (min)	Critical Time (min)	In Pipe Section (min)	Rainfall Intensity (mm/hr)	Total Peak Flow (m3/s)		Pipe Capacity (m3/s)	Friction Factor n	Pipe Slope (%)	Actual Pipe Diameter (m)	Pipe Length (m)	Full Velocity (m/s)
								0.000		0.00										
	A200	A190	A-12		40.360	0.410	16.548	16.548	15.000	22.00	0.73	24.8	1.140		1.319	0.013	4.6%	0.600	205.0	4.665
	A190	A180	A-11		16.610	0.410	6.810	23.358	15.000	22.25	0.80	24.3	1.579		2.156	0.013	3.8%	0.750	235.0	4.880
	A210	A180	A-10		26.630	0.410	10.918	34.276	15.000	22.60	1.12	23.9	2.272		2.624	0.013	5.6%	0.750	400.0	5.940
	A180	A170	POND P-6										**0.860**		1.005	0.013	12.4%	0.450	485.0	6.319
	A170	A100	-										0.860		1.053	0.013	13.6%	0.450	310.0	6.620
	A160	A150	A-7		13.290	0.410	5.449	5.449	15.000	15.00	0.99	30.8	0.466		0.475	0.013	7.3%	0.375	255.0	4.299
	A150	A130	A-6		8.870	0.410	3.637	9.086	15.000	15.29	0.36	29.7	0.750		0.843	0.013	8.8%	0.450	115.0	5.303
	A140	A130	A-5		6.520	0.410	2.673	11.759												
			A-4		9.070	0.410	3.719	15.478	15.000	15.00	1.01	30.8	1.324		1.381	0.013	1.5%	0.750	190.0	3.126
	A130	A120	A-3		14.960	0.410	6.134	21.611	15.000	15.35	0.11	29.7	1.782		4.312	0.013	15.0%	0.750	65.0	9.760
	A110	A100	POND P-4										**0.890**		1.360	0.013	10.0%	0.525	155.0	6.282
	A240	A230	A-8		16.930	0.800	13.544	13.544	15.000	15.00	2.10	30.8	1.159		1.574	0.013	2.0%	0.750	450.0	3.564
	A230	A220	POND P-2										**0.170**		0.250	0.013	6.7%	0.300	495.0	3.532
	A220	A100	POND P-1,2		25.730								**0.150**		0.328	0.013	11.5%	0.300	440.0	4.647
	A100	OFFSITE	-			0.000	0.000	0.000	15.000	15.00	#DIV/0!	30.8	0.000		0.000	0.013		0.200	400.0	0.000
	B150	B140	B-5		12.580	0.460	5.787	5.787	15.000	15.00	1.15	30.8	0.495		0.521	0.013	3.3%	0.450	225.0	3.273
	B140	B130	-			0.000	0.000	5.787	15.000	15.38	0.89	29.5	0.475		0.638	0.013	5.0%	0.450	215.0	4.008
	B160	B130	B-4		15.910	0.460	7.319	7.319	15.000	15.71	0.93	28.7	0.583		0.658	0.013	5.3%	0.450	230.0	4.140
	B130	B120	-			0.000	0.000	13.105	15.000	16.02	0.63	27.8	1.012		1.373	0.013	5.0%	0.600	185.0	4.856
	B170	B120	B-3		7.930	0.460	3.648	3.648	15.000	16.24	0.00	27.3	0.276		0.676	0.013	5.6%	0.450	235.0	4.252
	B120	B110	-			0.000	0.000	16.753	15.000	16.65	0.84	27.3	1.289		1.574	0.013	2.0%	0.750	155.0	3.564
	B180	B110	B-2		11.530	0.460	5.304	5.304	15.000	16.90	1.13	26.6	0.392		0.392	0.013	5.0%	0.375	240.0	3.550
	B200	B190	B-1		13.070	0.800	10.456	10.456	15.000	17.28	0.81	25.8	0.748		1.075	0.013	6.3%	0.525	240.0	4.967
	B190	B110	-			0.000	0.000	10.456	15.000	17.58	0.61	25.2	0.732		0.734	0.013	1.4%	0.600	95.0	2.596
	B110	B100	-			0.000	0.000	32.513	15.000	17.80	0.55	24.8	2.412		3.264	0.013	1.4%	1.050	125.0	3.769
	B100	OFFSITE											**0.880**		1.005	0.013	1.4%	0.675	125.0	2.808

Bold Font Indicates Specified Pond Release Rate

APPENDIX D

Unit Cost Estimates – Major Collectors

APPENDIX D
EAST CLAYTON NEIGHBOURHOOD CONCEPT PLAN
UNIT COST ESTIMATES: MAJOR COLLECTORS

Client: City of Surrey

Project No.: 36502-00
Estimate Type: Preliminary, for DCC Estimates

					East Clayton Major Collector Street Standards, Per Metre Costs					
					New Ultimate Major Collector			Upgrade Existing to Ultimate MC		
					Type E Residential	Type F Business Park	Type G Live/Work	Type E Residential	Type F Business Park	Type G Live/Work
ITEM	DESCRIPTION		UNIT PRICE	UNITS	$/M	$/M	$/M	$/M	$/M	$/M
1.0	**Site Works**									
1.1	Clearing & Grubbing		$25,000	ha	$60		$60	$60		
1.2	Erosion & Sediment Control		$10,000	ea.	$25		$25	$25		
1.3	Earthworks									
	1.3.1	common excavation	$22	cu.m.	$176		$132	$44		
	1.3.2	imported embankment fill	$20	cu.m.	$0		$0	$0		
2.0	**Road Subbase and Base**									
2.1	Subbase		$5	sq.m.	$60		$40	$10		
2.2	Subgrade Preparation		$2	sq.m.	$24		$16	$4		
3.0	**Asphaltic Concrete Pavement**									
3.1	Pavement (two lifts)		$9	sq.m.	$102		$68	$51		
3.2	Tack Coat		$0.50	sq.m.	$12		$8	$6		
4.0	**Sidewalk and Boulvevard**									
4.1	Concrete Curb and Gutter		$40	m	$0		$80	$0		
4.2	Concrete Sidewalk		$60	m	$120		$120	$120		
4.3	Bollards (5m spacing both sides)		$15	each (0.4 per m)	$0		$0	$6		
5.0	**Drainage and Sewer Works**									
5.1	Sanitary sewer with manholes		$400	m	$0		$0	$0		
5.2	Storm sewer with manholes & catchbasins		$435	m	$435		$435	$435		
5.3	Swale/Infiltration Trench and Pipe, including Lawn Drains		$200	m	$0		$0	$0		
6.0	**Water Works**									
6.1	watermain c/w fittings, hydrants, etc.		$320	m	$0		$0	$0		
6.2	Irrigation system for street trees (Type G)		$30	m	$0		$0	$0		
7.0	**Street Lighting**									
7.1	Pole c/w luminaire, ducts, etc. @ 30m spacing									
	7.1.1	Standard	$3,500	each (0.03 per m)	$0		$0	$0		
	7.1.2	Decorative (Type G)	$6,000	each (0.03 per m)	$180		$180	$180		
8.0	**Private Utilities**									
8.1	Hydro/Tel/Cable (including surface features)		$300	m	$300		$300	$300		
9.0	**Landscaping/Aesthetics**									
9.1	Grading and Hydroseeding of Boulevard		$6	sq.m.	$48		$24	$0		
9.2	Street Trees spaced at 10m centres (see Note 1)		$350	per tree (0.10 per m)	$35		$35	$35		
9.3	Plantings (shrubs and flowers, Type F)		$60	sq.m.	$0		$0	$0		
9.4	Stamped Concrete / Special Pavers (Type G)		$60	sq.m.	$0		$0	$0		
9.5	Street Furniture (Type G, see note 2 below)		$57	m	$57		$57	$57		
10.0	**Traffic Control**									
10.1	Signage		$5	m	$5		$5	$5		
10.2	Pavement Markings		$15	m	$15		$15	$15		
11.0	**Property Acquisition (Above 20m Dedication)**									
11.1	Residential		$200	sq.m.	$0		$0	$0		
11.2	Commercial		$300	sq.m.	$0		$0	$0		
TOTAL UNIT COST PER METRE					**$1,654**		**$1,600**	**$1,353**	**$0**	**$0**

NOTES
(1) these costs as per City of Surrey DCCs for street trees, and include tree cost, installation and watering after installation (as per Greg Ward, Parks and Recreation)
(2) from RS Means, 1998, assuming that every 100m there would be 4 benches ($950 each), 4 trash cans ($625 each) and 8 planter boxes ($400 each)